PHILIPPINE BIDDING DOCUMENTS

(As Harmonized with Development Partners)

CONSTRUCTION OF COAST GUARD LIGHT STATION CONRADA

Government of the Republic of the Philippines

Sixth Edition
29 October 2024

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Glossary of Terms, Abbreviations, and Acronyms

ABC – Approved Budget for the Contract.
ARCC – Allowable Range of Contract Cost.
BAC – Bids and Awards Committee.
Bid – A signed offer or proposal to undertake a contract submitted by a bidder in response to and in consonance with the requirements of the bidding documents. Also referred to as *Proposal* and *Tender.* (2016 revised IRR, Section 5[c])
Bidder – Refers to a contractor, manufacturer, supplier, distributor and/or consultant who submits a bid in response to the requirements of the Bidding Documents. (2016 revised IRR, Section 5[d])
Bidding Documents – The documents issued by the Procuring Entity as the bases for bids, furnishing all information necessary for a prospective bidder to prepare a bid for the Goods, Infrastructure Projects, and/or Consulting Services required by the Procuring Entity. (2016 revised IRR, Section 5[e])
BIR – Bureau of Internal Revenue.
BSP – Bangko Sentral ng Pilipinas.
CDA – Cooperative Development Authority.
Consulting Services – Refer to services for Infrastructure Projects and other types of projects or activities of the GOP requiring adequate external technical and professional expertise that are beyond the capability and/or capacity of the GOP to undertake such as, but not limited to: (i) advisory and review services; (ii) pre-investment or feasibility studies; (iii) design; (iv) construction supervision; (v) management and related services; and (vi) other technical services or special studies. (2016 revised IRR, Section 5[i])
Contract – Refers to the agreement entered into between the Procuring Entity and the Supplier or Manufacturer or Distributor or Service Provider for procurement of Goods and Services; Contractor for Procurement of Infrastructure Projects; or Consultant or Consulting Firm for Procurement of Consulting Services; as the case may be, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
Contractor – is a natural or juridical entity whose proposal was accepted by the Procuring Entity and to whom the Contract to execute the Work was awarded. Contractor as used in these Bidding Documents may likewise refer to a supplier, distributor, manufacturer, or consultant.
CPI – Consumer Price Index.
DOLE – Department of Labor and Employment.
DTI – Department of Trade and Industry.
Foreign-funded Procurement or Foreign-Assisted Project – Refers to procurement whose funding source is from a foreign government, foreign or international financing institution as specified in the Treaty or International or Executive Agreement. (2016 revised IRR, Section 5[b]).
GFI – Government Financial Institution.
GOCC – Government-owned and/or –controlled corporation.
Goods – Refer to all items, supplies, materials and general support services, except Consulting Services and Infrastructure Projects, which may be needed in the transaction of public businesses or in the pursuit of any government undertaking, project or activity, whether in the nature of equipment, furniture, stationery, materials for construction, or personal property of any kind, including non-personal or contractual services such as the repair and maintenance of

equipment and furniture, as well as trucking, hauling, janitorial, security, and related or analogous services, as well as procurement of materials and supplies provided by the Procuring Entity for such services. The term "related" or "analogous services" shall include, but is not limited to, lease or purchase of office space, media advertisements, health maintenance services, and other services essential to the operation of the Procuring Entity. (2016 revised IRR, Section 5[r])

GOP – Government of the Philippines.

Infrastructure Projects – Include the construction, improvement, rehabilitation, demolition, repair, restoration or maintenance of roads and bridges, railways, airports, seaports, communication facilities, civil works components of information technology projects, irrigation, flood control and drainage, water supply, sanitation, sewerage and solid waste management systems, shore protection, energy/power and electrification facilities, national buildings, school buildings, hospital buildings, and other related construction projects of the government. Also referred to as *civil works or works*. (2016 revised IRR, Section 5[u])

LGUs – Local Government Units.

NFCC – Net Financial Contracting Capacity.

NGA – National Government Agency.

PCAB – Philippine Contractors Accreditation Board.

PhilGEPS - Philippine Government Electronic Procurement System.

Procurement Project – refers to a specific or identified procurement covering goods, infrastructure project or consulting services. A Procurement Project shall be described, detailed, and scheduled in the Project Procurement Management Plan prepared by the agency which shall be consolidated in the procuring entity's Annual Procurement Plan. (GPPB Circular No. 06-2019 dated 17 July 2019)

PSA – Philippine Statistics Authority.

SEC – Securities and Exchange Commission.

SLCC – Single Largest Completed Contract.

UN – United Nations.

Section I. Invitation to Bid

1. The **Philippine Coast Guard**, through the **Capital Outlay 2024** intends to apply the sum of **Eight Million Two Hundred Fifty-Five Thousand Six Hundred Thirty-One Pesos and 02/100 (₱8,255,631.02)** being the Approved Budget for the Contract (ABC) to payments under the contract for **Construction of Coast Guard Light Station Conrada.** Bids received in excess of the ABC shall be automatically rejected at bid opening.

2. The **Philippine Coast Guard** now invites bids for the above Procurement Project. Completion of the Work is required within **One Hundred Forty (140) calendar days** from the date of receipt of the Notice to Proceed. Bidders should have completed a contract similar to the Project. The description of an eligible bidder is contained in the Bidding Documents, particularly, in Section II (Instructions to Bidders).

3. Bidding will be conducted through open competitive bidding procedures using non-discretionary "*pass/fail*" criterion as specified in the 2016 revised Implementing Rules and Regulations (IRR) of Republic Act (RA) No. 9184.

4. Interested bidders may obtain further information from **Philippine Coast Guard** and inspect the Bidding Documents at the address given below from Mondays to Fridays during office hours from 8:00 AM – 5:00 PM except non-working days (i.e. Saturday and Sunday), legal holiday, or special non-working holiday, or other nonworking days duly declared by the President, Governor, Mayor or other Government Official authorized to make such declaration.

5. A complete set of Bidding Documents may be acquired by interested bidders on 29 October 2024 – 19 November 2024 from given address and website/s below and upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB, in the amount of Ten Thousand Pesos (PhP10,000.00). The Procuring Entity shall allow the bidder to present its proof of payment for the fees in person or through electronic means.

6. The **Philippine Coast Guard** will hold a Pre-Bid Conference on **06 November 2024, 9:00 a.m.** onwards at the Conference Room, Second (2nd) Floor, Administrative Building, Philippine Coast Guard National Headquarters, 139 25th Street, Port Area, 1018 Manila and on-line using the videoconferencing platform and details described below, which shall be open to prospective bidders.

7. Bids must be duly received by the BAC Secretariat through *manual submission* at the address as indicated below on or before 19 November 2024 at 9:00 AM. Late bids shall not be accepted.

8. All bids must be accompanied by a bid security in any of the acceptable forms and in the amount stated in **ITB** Clause 16.

9. Bid opening shall be on **19 November 2024** at 10:00 am onwards at the Conference Room, National Headquarters Philippine Coast Guard, 139 25th Street Port Area, Manila. Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

10. The Bids and Awards Committee (BAC) shall use a non-discretionary and non-discriminatory measure based on sheer luck or chance, which is "DRAW LOTS," in the event that two or more bidders have been post-qualified and determined as the bidder having the Lowest Calculated Responsive Bid (LCRB) to determine the final LCRB, based on the following procedures:

    a. In alphabetical order, the bidders shall pick one rolled paper.
    b. The lucky bidder who would pick the paper with a "CONGRATULATIONS" remark shall be declared as the final bidder having the LCRB and recommended for award of the contract.

11. The Philippine Coast Guard reserves the right to reject any and all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Sections 35.6 and 41 of the 2016 revised Implementing Rules and Regulations (IRR) of RA No. 9184, without thereby incurring any liability to the affected bidder or bidders.

12. For further information, please refer to:

    CAPT BENEDICTO C BARTOLOME PCG
    Commander, Coast Guard Procurement Service
    Coast Guard Procurement Service
    Second (2nd) Floor, Bachrach Building 1
    23rd St. Cor A.C Delgado St. Port Area, 1018 Manila
    Email Address: procurement@coastguard.gov.ph
    Contact Number: 09565787067

13. You may visit the following websites:

    For downloading of Bidding Documents: www.philgeps.gov.ph and www.coastguard.gov.ph

RADM HOSTILLO ARTURO E CORNELIO PCG
Chairperson, NHQ-PCG BAC

Section II. Instructions to Bidders

1. Scope of Bid

The Procuring Entity, **Philippine Coast Guard** invites Bids for the **Construction of Coast Guard Light Station Conrada**, with Project Identification Number *IB No. 2024-033*.

The Procurement Project (referred to herein as "Project") is for the construction of Works, as described in Section VI (Specifications).

2. Funding Information

2.1. The GOP through the source of funding as indicated below for Capital Outlay Continuing Fund in the amount of **Eight Million Two Hundred Fifty-Five Thousand Six Hundred Thirty-one Pesos and 02/100 (**PhP8,255,631.02).

2.2 The source of funding is General Appropriations Act (Continuing Budget) with Special Allotment Release Order No. SARO-BMB-A-24-0007013 dated 19 August 2024.

3. Bidding Requirements

The Bidding for the Project shall be governed by all the provisions of RA No. 9184 and its 2016 revised IRR, including its Generic Procurement Manual and associated policies, rules and regulations as the primary source thereof, while the herein clauses shall serve as the secondary source thereof.

Any amendments made to the IRR and other GPPB issuances shall be applicable only to the ongoing posting, advertisement, or invitation to bid by the BAC through the issuance of a supplemental or bid bulletin.

The Bidder, by the act of submitting its Bid, shall be deemed to have inspected the site, determined the general characteristics of the contracted Works and the conditions for this Project, such as the location and the nature of the work; (b) climatic conditions; (c) transportation facilities; (c) nature and condition of the terrain, geological conditions at the site communication facilities, requirements, location and availability of construction aggregates and other materials, labor, water, electric power and access roads; and (d) other factors that may affect the cost, duration and execution or implementation of the contract, project, or work and examine all instructions, forms, terms, and project requirements in the Bidding Documents.

4. Corrupt, Fraudulent, Collusive, Coercive, and Obstructive Practices

The Procuring Entity, as well as the Bidders and Contractors, shall observe the highest standard of ethics during the procurement and execution of the contract. They or through an agent shall not engage in corrupt, fraudulent, collusive, coercive, and obstructive practices defined under Annex "I" of the 2016 revised IRR of RA No. 9184 or other integrity violations in competing for the Project.

5. Eligible Bidders

5.1. Only Bids of Bidders found to be legally, technically, and financially capable will be evaluated.

5.2. The Bidder must have an experience of having completed a Single Largest Completed Contract (SLCC) that is similar to this Project, equivalent to at least fifty percent (50%) of the ABC adjusted, if necessary, by the Bidder to current prices using the PSA's CPI, except under conditions provided for in Section 23.4.2.4 of the 2016 revised IRR of RA No. 9184.

A contract is considered to be "similar" to the contract to be bid if it has the major categories of work stated in the **BDS**.

5.3. For Foreign-funded Procurement, the Procuring Entity and the foreign government/foreign or international financing institution may agree on another track record requirement, as specified in the Bidding Document prepared for this purpose.

5.4. The Bidders shall comply with the eligibility criteria under Section 23.4.2 of the 2016 IRR of RA No. 9184.

6. Origin of Associated Goods

There is no restriction on the origin of Goods other than those prohibited by a decision of the UN Security Council taken under Chapter VII of the Charter of the UN.

7. Subcontracts

7.1. The Bidder may subcontract portions of the Project to the extent allowed by the Procuring Entity as stated herein, but in no case more than fifty percent (50%) of the Project.

The Procuring Entity has prescribed that Subcontracting is not allowed.

8. Pre-Bid Conference

The Procuring Entity will hold a pre-bid conference for this Project on the specified details indicated in paragraph 6 of the **IB**

9. Clarification and Amendment of Bidding Documents

Prospective bidders may request for clarification on and/or interpretation of any part of the Bidding Documents. Such requests must be in writing and received by the Procuring Entity, either at its given address or through electronic mail indicated in the **IB**, at least ten (10) calendar days before the deadline set for the submission and receipt of Bids.

10. Documents Comprising the Bid: Eligibility and Technical Components

10.1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

10.2. If the eligibility requirements or statements, the bids, and all other documents for submission to the BAC are in foreign language other than English, it must be accompanied by a translation in English, which shall be authenticated by the appropriate Philippine foreign service establishment, post, or the equivalent office having jurisdiction over the foreign bidder's affairs in the Philippines. For Contracting Parties to the Apostille Convention, only the translated documents shall be authenticated through an apostille pursuant to GPPB Resolution No. 13-2019 dated 23 May 2019. The English translation shall govern, for purposes of interpretation of the bid.

10.3. A valid PCAB License is required, and in case of joint ventures, a valid special PCAB License, and registration for the type and cost of the contract for this Project. Any additional type of Contractor license or permit shall be indicated in the **BDS**.

10.4. A List of Contractor's key personnel (e.g., Project Manager, Project Engineers, Materials Engineers, and Foremen) assigned to the contract to be bid, with their complete qualification and experience data shall be provided. These key personnel must meet the required minimum years of experience set in the **BDS**.

10.5. A List of Contractor's major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership, certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be, must meet the minimum requirements for the contract set in the **BDS**.

11. Documents Comprising the Bid: Financial Component

11.1. The second bid envelope shall contain the financial documents for the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

11.2. Any bid exceeding the ABC indicated in paragraph 1 of the **IB** shall not be accepted.

11.3. For Foreign-funded procurement, a ceiling may be applied to bid prices provided the conditions are met under Section 31.2 of the 2016 revised IRR of RA No. 9184.

12. Alternative Bids

Bidders shall submit offers that comply with the requirements of the Bidding Documents, including the basic technical design as indicated in the drawings and specifications.

Unless there is a value engineering clause in the **BDS**, alternative Bids shall not be accepted.

13. Bid Prices

All bid prices for the given scope of work in the Project as awarded shall be considered as fixed prices, and therefore not subject to price escalation during contract implementation, except under extraordinary circumstances as determined by the NEDA and approved by the GPPB pursuant to the revised Guidelines for Contract Price Escalation guidelines.

14. Bid and Payment Currencies

14.1. Bid prices may be quoted in the local currency or tradeable currency accepted by the BSP at the discretion of the Bidder. However, for purposes of bid evaluation, Bids denominated in foreign currencies shall be converted to Philippine currency based on the exchange rate as published in the BSP reference rate bulletin on the day of the bid opening.

14.2 Payment of the contract price shall be made in Philippine Pesos

15. Bid Security

15.1. The Bidder shall submit a Bid Securing Declaration or any form of Bid Security in the amount indicated in the **BDS**, which shall be not less than the percentage of the ABC in accordance with the schedule in the **BDS**.

15.2. The Bid and bid security shall be valid for a period of One Hundred twenty (120 CD) from the Date of Bid Opening. Any bid not accompanied by an acceptable bid security shall be rejected by the Procuring Entity as non-responsive.

16. Sealing and Marking of Bids

Each Bidder shall submit one copy of the first and second components of its Bid.

The Procuring Entity may request additional hard copies and/or electronic copies of the Bid. However, failure of the Bidders to comply with the said request shall not be a ground for disqualification.

If the Procuring Entity allows the submission of bids through online submission to the given website or any other electronic means, the Bidder shall submit an electronic copy of its Bid, which must be digitally signed. An electronic copy that cannot be opened or is corrupted shall be considered non-responsive and, thus, automatically disqualified.

17. Deadline for Submission of Bids

The Bidders shall submit on the specified date and time and either at its physical address or through online submission as indicated in paragraph 7 of the **IB.**

18. Opening and Preliminary Examination of Bids

18.1. The BAC shall open the Bids in public at the time, on the date, and at the place specified in paragraph 9 of the **IB**. The Bidders' representatives who are present shall sign a register evidencing their attendance. In case videoconferencing, webcasting or other similar technologies will be used, attendance of participants shall likewise be recorded by the BAC Secretariat.

In case the Bids cannot be opened as scheduled due to justifiable reasons, the rescheduling requirements under Section 29 of the 2016 revised IRR of RA No. 9184 shall prevail.

18.2. The preliminary examination of Bids shall be governed by Section 30 of the 2016 revised IRR of RA No. 9184.

19. Detailed Evaluation and Comparison of Bids

19.1. The Procuring Entity's BAC shall immediately conduct a detailed evaluation of all Bids rated "*passed*" using non-discretionary pass/fail criteria. The BAC shall consider the conditions in the evaluation of Bids under Section 32.2 of 2016 revised IRR of RA No. 9184.

19.2. If the Project allows partial bids, all Bids and combinations of Bids as indicated in the **BDS** shall be received by the same deadline and opened and evaluated simultaneously so as to determine the Bid or combination of Bids offering the lowest calculated cost to the Procuring Entity. Bid Security as required by **ITB** Clause 16 shall be submitted for each contract (lot) separately.

19.3. In all cases, the NFCC computation pursuant to Section 23.4.2.6 of the 2016 revised IRR of RA No. 9184 must be sufficient for the total of the ABCs for all the lots participated in by the prospective Bidder.

20. Post Qualification

Within a non-extendible period of five (5) calendar days from receipt by the Bidder of the notice from the BAC that it submitted the Lowest Calculated Bid, the Bidder shall submit its latest income and business tax returns filed and paid through the BIR Electronic Filing and Payment System (eFPS), and other appropriate licenses and permits required by law and stated in the **BDS**.

21. Signing of the Contract

The documents required in Section 37.2 of the 2016 revised IRR of RA No. 9184 shall form part of the Contract. Additional Contract documents are indicated in the **BDS**.

Section III. Bid Data Sheet

Bid Data Sheet

<table>
<tr><td>ITB Clause</td><td></td></tr>
<tr><td>5.2</td><td>For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall be General Building Projects</td></tr>
<tr><td>7.1</td><td>No portion of the project shall be subcontracted.</td></tr>
<tr><td>10.3</td><td>A valid Philippine Contractors Accreditation Board (PCAB) license with the following particulars:
<table>
<tr><td>Classification</td><td>License Category</td></tr>
<tr><td>General Building</td><td>C & D</td></tr>
</table>
</td></tr>
<tr><td>10.4</td><td>The key personnel must meet the required minimum years of experience set below:
<table>
<tr><td colspan="2">Key Personnel</td><td>Minimum Years of Experience</td><td>General Experience</td><td>Relevant Experience</td></tr>
<tr><td>1</td><td>Project Manager</td><td>7</td><td>-Licensed architect or engineer.
- Experience in managing construction projects of similar scale and complexity.</td><td>-Experience in managing lighthouse construction projects or similar marine structures would be advantageous.</td></tr>
<tr><td>2</td><td>Project Engineer/ Architect</td><td>5</td><td>-Licensed architect or engineer.
-Experience in civil engineering / architectural design and construction project management.</td><td>-Experience in overseeing construction projects involving structural engineering and site management.</td></tr>
<tr><td>3</td><td>Materials Engineer</td><td>5</td><td>-Materials Engineer I accredited by DPWH.
- Experience in materials testing, selection, and quality control.</td><td>- Experience in construction projects involving specialized materials for maritime environments.</td></tr>
<tr><td>4</td><td>Foreman</td><td>5</td><td>-Experience in construction</td><td>-Experience in overseeing</td></tr>
</table>
</td></tr>
</table>

				supervision and management.	construction crews for building projects, preferably in maritime environments.
	5	Safety and Health Officer	5	-Experience in occupational health and safety management.	-Experience in implementing safety protocols and regulations on construction sites, including those in maritime environments.
	6	AutoCAD Operator	5	-Proficiency in AutoCAD software and drafting techniques.	-Experience in preparing detailed architectural, structural, and electrical drawings for construction projects, preferably including experience in maritime or coastal structures.

10.5 The minimum major equipment requirements are the following:

Plant/Equipment	Capacity	Number of Units
Backhoe	At least 0.80 cu.m.	1
Dump Truck	At least 10 cubic yards	1
Plate Compactor	At least 2 tons	1
Concrete Vibrator	At least 3600 RPM	1
Concrete Mixer	At least 7 cu.ft.	1
Service Vehicle	At least five-seater	1

12 Implementation of Value Engineering activities shall not be applicable.

15.1 The bid security shall be in the form of a Bid Securing Declaration or any of the following forms and amounts:

a. The amount of not less than *two percent (2%) of ABC or at least One Hundred Sixty-Five Thousand One Hundred Twelve Pesos and 62/100 (Php165,112.62),* if bid security is in cash, cashier's/manager's check, bank draft/guarantee or irrevocable letter of credit;

	b. The amount of not less than *five percent (5%) of ABC or at least Four Hundred Twelve Thousand Seven Hundred Eighty-One Pesos and 55/100 (Php412,781.55),* if bid security is in Surety Bond.
19.2	Partial bid is not allowed. The infrastructure project is packaged in a single lot and the lot shall not be divided into sub-lots for the purpose of bidding, evaluation, and contract award.
20	Additional license and/or permits required: 1. Building Permit 2. Zoning Clearance 3. Occupancy Permit The bidder having the Lowest Calculated Bid (LCB) or Single Calculated Bid (SCB) shall submit within a non-extendible period of five (5) calendar days from the BAC Notice as the LCB/SCB, the following: 1. In case the bidder has just submitted the Class "A" Legal eligibility requirements and Audited Financial Statement (AFS), a valid PhilGEPS Registration Certificate; 2. Latest income and business tax returns filed and paid through the BIR Electronic Filing and Payment System (eFPS); In accordance with Executive Order (E.O.) No. 398, Revenue Regulation (R.R.) No. 03-2005 and Revenue Memorandum Circular (RMC) 16 – 2005, the above-mentioned tax returns shall refer to the following: 2.1. Latest Income Tax Return (ITR) shall be the ITR for the preceding year, whether calendar or fiscal, and 2.2. Latest Business Tax Returns shall refer to the Value Added Tax (VAT) or Percentage Tax filed and paid covering the previous six (6) months before the date of Submission, Receipt, Opening & Preliminary Examination of Bids.
21	The following shall form part of the Contract Agreement which shall be submitted by the winning contractor within ten (10) calendar days from the date of receipt of the Notice of Award (NOA) prior to contract signing: 1. Manpower Schedule 2. Equipment Utilization Schedule 3. Construction Schedule and S-Curve 4. PERT/CPM 5. Construction Methods, and 6. Construction Safety and Health Program duly approved by the Department of Labor and Employment

	In addition to the submission of any of the allowable forms of Performance Security provided under Section 39.2 of the 2016 Revised Implementing Rules and Regulations (IRR) of Republic Act (R.A.) No. 9184 and above-stated contract documents, the bidder having the Lowest/Single Calculated Responsive Bid shall submit a Certificate of No Pending Case within ten (10) calendar days from receipt of the NOA.

Section IV. General Conditions of Contract

1. Scope of Contract

This Contract shall include all such items, although not specifically mentioned, that can be reasonably inferred as being required for its completion as if such items were expressly mentioned herein. All the provisions of RA No. 9184 and its 2016 revised IRR, including the Generic Procurement Manual, and associated issuances, constitute the primary source for the terms and conditions of the Contract, and thus, applicable in contract implementation. Herein clauses shall serve as the secondary source for the terms and conditions of the Contract.

This is without prejudice to Sections 74.1 and 74.2 of the 2016 revised IRR of RA No. 9184 allowing the GPPB to amend the IRR, which shall be applied to all procurement activities, the advertisement, posting, or invitation of which were issued after the effectivity of the said amendment.

2. Sectional Completion of Works

If sectional completion is specified in the **Special Conditions of Contract (SCC)**, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date shall apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

3. Possession of Site

4.1. The Procuring Entity shall give possession of all or parts of the Site to the Contractor based on the schedule of delivery indicated in the **SCC,** which corresponds to the execution of the Works. If the Contractor suffers delay or incurs cost from failure on the part of the Procuring Entity to give possession in accordance with the terms of this clause, the Procuring Entity's Representative shall give the Contractor a Contract Time Extension and certify such sum as fair to cover the cost incurred, which sum shall be paid by Procuring Entity.

4.2. If possession of a portion is not given by the above date, the Procuring Entity will be deemed to have delayed the start of the relevant activities. The resulting adjustments in contract time to address such delay may be addressed through contract extension provided under Annex "E" of the 2016 revised IRR of RA No. 9184.

4. The Contractor's Obligations

The Contractor shall employ the key personnel named in the Schedule of Key Personnel indicating their designation, in accordance with **ITB** Clause 10.3 and specified in the **BDS**, to carry out the supervision of the Works.

The Procuring Entity will approve any proposed replacement of key personnel only if their relevant qualifications and abilities are equal to or better than those of the personnel listed in the Schedule.

5. Performance Security

5.1. Within ten (10) calendar days from receipt of the Notice of Award from the Procuring Entity but in no case later than the signing of the contract by both parties, the successful Bidder shall furnish the performance security in any of the forms prescribed in Section 39 of the 2016 revised IRR.

5.2. The Contractor, by entering into the Contract with the Procuring Entity, acknowledges the right of the Procuring Entity to institute action pursuant to RA No. 3688 against any subcontractor be they an individual, firm, partnership, corporation, or association supplying the Contractor with labor, materials and/or equipment for the performance of this Contract.

6. Site Investigation Reports

The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to in the **SCC** supplemented by any information obtained by the Contractor.

7. Warranty

7.1. In case the Contractor fails to undertake the repair works under Section 62.2.2 of the 2016 revised IRR, the Procuring Entity shall forfeit its performance security, subject its property(ies) to attachment or garnishment proceedings, and perpetually disqualify it from participating in any public bidding. All payables of the GOP in his favor shall be offset to recover the costs.

7.2. The warranty against Structural Defects/Failures, except that occasioned-on force majeure, shall cover the period from the date of issuance of the Certificate of Final Acceptance by the Procuring Entity. Specific duration of the warranty is found in the **SCC**.

8. Liability of the Contractor

Subject to additional provisions, if any, set forth in the **SCC**, the Contractor's liability under this Contract shall be as provided by the laws of the Republic of the Philippines. If the Contractor is a joint venture, all partners to the joint venture shall be jointly and severally liable to the Procuring Entity.

9. Termination for Other Causes

Contract termination shall be initiated in case it is determined *prima facie* by the Procuring Entity that the Contractor has engaged, before, or during the implementation of the contract, in unlawful deeds and behaviors relative to contract acquisition and implementation, such as, but not limited to corrupt, fraudulent, collusive, coercive, and obstructive practices as stated in **ITB** Clause 4.

10. Dayworks

Subject to the guidelines on Variation Order in Annex "E" of the 2016 revised IRR of RA No. 9184, and if applicable as indicated in the **SCC**, the Dayworks rates in the Contractor's Bid shall be used for small additional amounts of work only when the Procuring Entity's Representative has given written instructions in advance for additional work to be paid for in that way.

11. Program of Work

11.1. The Contractor shall submit to the Procuring Entity's Representative for approval the said Program of Work showing the general methods, arrangements, order, and timing for all the activities in the Works. The submissions of the Program of Work are indicated in the **SCC.**

11.2. The Contractor shall submit to the Procuring Entity's Representative for approval an updated Program of Work at intervals no longer than the period stated in the **SCC.** If the Contractor does not submit an updated Program of Work within this period, the Procuring Entity's Representative may withhold the amount stated in the **SCC** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program of Work has been submitted.

12. Instructions, Inspections and Audits

The Contractor shall permit the GOP or the Procuring Entity to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors of the GOP or the Procuring Entity, as may be required.

13. Advance Payment

The Procuring Entity shall, upon a written request of the Contractor which shall be submitted as a Contract document, make an advance payment to the Contractor in an amount not exceeding fifteen percent (15%) of the total contract price, to be made in lump sum, or at the most two installments according to a schedule specified in the **SCC**, subject to the requirements in Annex "E" of the 2016 revised IRR of RA No. 9184.

14. Progress Payments

The Contractor may submit a request for payment for Work accomplished. Such requests for payment shall be verified and certified by the Procuring Entity's Representative/Project Engineer. Except as otherwise stipulated in the **SCC**, materials and equipment delivered on the site but not completely put in place shall not be included for payment.

15. Operating and Maintenance Manuals

15.1. If required, the Contractor will provide "as built" Drawings and/or operating and maintenance manuals as specified in the **SCC.**

15.2. If the Contractor does not provide the Drawings and/or manuals by the dates stated above, or they do not receive the Procuring Entity's Representative's approval, the Procuring Entity's Representative may withhold the amount stated in the **SCC** from payments due to the Contractor.

Section V. Special Conditions of Contract

Special Conditions of Contract

GCC Clause	
2	No sectional completion.
4.1	The Procuring Entity shall give possession of all parts of the site to the contractor upon receipt of Notice to Proceed (NTP) until the date of its project completion and acceptance and/or termination.
6	The site investigation report is Soil Foundation Investigation Report.
7.2	Fifteen (15) years starting from the date of issuance of the Certificate of Final Acceptance.
10	Day works are applicable at the rate shown in the Contractor's original Bid.
11.1	The Contractor shall submit the Program of Work to the Procuring Entity's Representative within fourteen (14) calendar days of delivery of the Notice of Award.
11.2	The amount to be withheld for late submission of an updated Program of Work is equivalent to one tenth of one percent (1/10 of 1%) of the total contract price for every day of delay.
13	No advance payment is allowed.
14	Materials and equipment delivered on the site but not completely put in place shall not be included for payment.
15.1	The date by which operating and maintenance manuals are required is on final billing. The date by which "as built" drawings are required is on final billing. The Contractor is required to submit five (5) sets of "as built" drawings in blue/white print (20" x 30" size) duly signed and sealed by the supervising professionals, and electronic copy in CAD and pdf file format (electronically signed).
15.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is equivalent to the amount of the final payment to be released.

Section VI. Specifications

(See Annex A – Specifications)

Section VII. Drawings

(See Annex B – Drawings)

Section VIII. Bill of Quantities

(See Annex C – Bill of Quantities)

Section IX. Checklist of Technical and Financial Documents

Checklist of Technical and Financial Documents

Each Bidder shall submit one (1) original and six (6) copies of the first and second components of its bid through their duly authorized representatives.

All envelopes shall:

a. contain the name of the contract to be bid in capital letters;

b. bear the name and address of the Bidder in capital letters;

c. be addressed to the BAC with the following details:

BIDS AND AWARDS COMMITTEE (BAC)
PHILIPPINE COAST GUARD – NATIONAL HEADQUARTERS

d. bear the specific identification of this bidding process; and

e. bear a warning "DO NOT OPEN BEFORE…" the date and time for the opening of bids.

I. TECHNICAL COMPONENT ENVELOPE

Class "A" Documents

Legal Documents

☐ (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages) in accordance with Section 8.5.2 of the IRR;

The PhilGEPS Certificate of Platinum Registration and Membership in accordance with Section 8.5.2 of the 2016 revised IRR of RA 9184 contains the following caveat to reflect that through the submission of said Certificate, the Bidder certifies:

a) the authenticity, genuineness, validity, and completeness of the copy of the original eligibility documents submitted;
b) the veracity of the statements and information contained therein;
c) that the Certificate is not a guaranty that the named registrant will be declared eligible without first being determined to be such for that particular bidding nor is it evidence that the same has passed the post-qualification stage; and

d) that any finding of concealment, falsification, or misrepresentation of any of the eligibility documents submitted, or the contents thereof shall be a ground for disqualification of the Bidder from further participation in the bidding process, without prejudice to the imposition of appropriate administrative, civil and criminal penalty in accordance with the laws.

It shall likewise state that for the purpose of updating the said Certificate, all Class "A" Eligibility Documents covered by Section 8.5.2 of the 2016 revised IRR of RA 9184 supporting the veracity, authenticity and validity of the Certificate shall remain current and updated, and that failure by the prospective bidder to update its Certificate with the current and updated Class "A" Eligibility Documents covered by the afore-cited Section of the same IRR shall result in the automatic suspension of the validity of its Certificate until such time that all of the expired Class "A" Eligibility Documents has been updated.

During the conduct of post-qualification, bidders are likewise requested to submit copies of the following:

1. Securities and Exchange Commission (SEC) Registration Certificate for corporations, partnerships and/or joint ventures, Department of Trade and Industry (DTI) Registration Certificate for sole proprietorship, or Cooperative Development Authority (CDA) Registration Certificate for cooperatives;

2. Valid Mayor's or Business Permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas.

3. Valid Tax Clearance Certificate per Executive Order (E.O.) No. 398, series of 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR); **AND**

4. Latest AFS stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year. In case the AFS for the preceding calendar year is not yet available, said AFS should not be earlier than two (2) years from the deadline for the Submission and Receipt of Bids.

Technical Documents

☐ (b) Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid; **and**

The Statement of all On-going Government and Private Contracts shall indicate for each contract, the following:

- name of contract, location, project/contract cost;
- owner name, address, telephone numbers;
- nature of work;

- contractor's role;
- contract duration, date started, date of completion;
- percent accomplishment; and
- value of outstanding works;

For purposes of post-qualification, the bidders are required to submit copies of the Notices of Award (NOA), Contract/Purchase Order and Notice to Proceed (NTP) for all on-going government contracts. On the other hand, for on-going private contracts, bidders shall submit a copy of its contract and/or other equivalent documents of the NOA and NTP, if any.

Non-submission of copies of the NOA, Contract/Purchase Order and NTP on the deadline for the Submission and Receipt of Bids shall not be a ground for the bidder's disqualification. However, the bidder having the Lowest/Single Calculated Bid shall be requested by the Technical Working Group (TWG) to provide copies of the aforesaid documents as part of the verification and validation process during post-qualification.

☐ (c) Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided under the rules; **and**

The statement identifying the Single Largest Completed Contract (SLCC) shall indicate the following:

(a) name of the contract;
(b) date of the contract;
(c) contract duration;
(d) owner's name and address;
(e) contact person and contact details;
(f) nature of work;
(g) amount of completed contracts, adjusted by the bidder to current prices using PSA's consumer price index, if necessary for purposes of meeting the SLCC requirement;
(h) date of completion; and
(i) Owner's Certificate of Final Acceptance or Contractor's Performance Evaluation System Rating (CPES) with a "Satisfactory" rating, which should be attached as an integral part of the SLCC. In case of contracts with the private sector, an equivalent document shall be submitted.

☐ (d) Philippine Contractors Accreditation Board (PCAB) License; **or** Special PCAB License in case of Joint Ventures **and** registration for the type and cost of the contract to be bid; **and**

☐ (e) Original copy of Bid Security. If in the form of a Surety Bond, submit also a certification issued by the Insurance Commission **or** original copy of Notarized Bid Securing Declaration with the following details: **and**

(f) Project Requirements, which shall include the following:

☐ f.1. Organizational chart for the contract to be bid;

☐ f.2. List of contractor's key personnel (*e.g.*, Project Manager, Project Engineers, Materials Engineers, and Foremen), to be assigned to the contract to be bid, with their complete qualification and experience data;

☐ f.3. List of contractor's major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership or certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be; **and**

☐ (g) Original duly signed Omnibus Sworn Statement (OSS) **and** if applicable, Original Notarized Secretary's Certificate in case of a corporation, partnership, or cooperative; or Original Special Power of Attorney of all members of the joint venture giving full power and authority to its officer to sign the OSS and do acts to represent the Bidder.

Reminder: If the prospective bidder's representative who will attend the Submission, Receipt, Opening and Preliminary Examination of Bids is different from the authorized representative to do, execute and perform any and all acts necessary and/or to represent the prospective bidder in the bidding, then the prospective bidder can include the name/s of said representative in the above-mentioned proofs of authorization (e.g., original copy of the duly notarized Secretary's Certificate for corporations, Board/Partnership Resolution for partnerships, corporations, and/or joint ventures or an original copy of the Special Power of Attorney for sole proprietorships, whichever is applicable).

Financial Documents

☐ (h) The prospective bidder's computation of Net Financial Contracting Capacity (NFCC).

Bidders must submit a computation of its NFCC, which must be at least equal to the ABC to be bid.

The minimum amount of the NFCC computation is Eight Million Two Hundred Fifty-Five Thousand Six Hundred Thirty-one Pesos and 02/100 (PhP8,255,631.02).

NFCC = [(Current assets minus current liabilities) (15)] minus the value of all outstanding or uncompleted portions of the projects under ongoing contracts, including awarded contracts yet to be started, coinciding with the contract to be bid.

The values of the domestic bidder's current assets and current liabilities shall be based on the latest Audited Financial Statements submitted to the BIR.

Class "B" Documents

☐ (i) If applicable, duly signed joint venture agreement (JVA) in accordance with RA No. 4566 and its IRR in case the joint venture is already in existence **or**

duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful.

Each partner of the joint venture shall submit their respective valid and updated PhilGEPS Certificates of Registration in accordance with Section 8.5.2 of the 2016 Revised IRR of R.A. 9184.

For purposes of post-qualification, all partners of the joint venture shall be requested to submit all of the following valid/updated Class "A" Eligibility Documents:

1. SEC Registration Certificate for corporations, partnerships and/or joint ventures; DTI Registration Certificate for sole proprietorship; or CDA Registration Certificate for cooperatives;
2. Valid Mayor's Permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas;
3. Valid Tax Clearance Certificate;
4. PCAB License and Registration; and
4. Latest AFS, stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year.

The submission of technical and financial eligibility documents by any of the joint venture partners constitutes compliance: *Provided,* That the partner responsible to submit the NFCC shall likewise submit the Statement of all of its ongoing contracts and Audited Financial Statements.

II. FINANCIAL COMPONENT OF THE BID

☐ (j) Original of duly signed and accomplished Financial Bid Form; **and**

Other documentary requirements under RA No. 9184

☐ (k) Original of duly signed Bid Prices in the Bill of Quantities; **and**

☐ (l) Duly accomplished Detailed Estimates Form, including a summary shee indicating the unit prices of construction materials, labor rates, and equipmen rentals used in coming up with the Bid; **and**

☐ (m) Cash Flow by Quarter.

Section IX. Bidding Forms

TABLE OF CONTENTS

Bid Form for the Procurement of Infrastructure Projects

[shall be submitted with the Bid]

BID FORM

Date : _____

Project Identification No. : _____

To: [name and address of Procuring Entity]

Having examined the Philippine Bidding Documents (PBDs) including the Supplemental or Bid Bulletin Numbers *[insert numbers]*, the receipt of which is hereby duly acknowledged, we, the undersigned, declare that:

a. We have no reservation to the PBDs, including the Supplemental or Bid Bulletins, for the Procurement Project: *[insert name of contract];*

b. We offer to execute the Works for this Contract in accordance with the PBDs;

c. The total price of our Bid in words and figures, excluding any discounts offered below is: *[insert information]*;

d. The discounts offered and the methodology for their application are: *[insert information]*;

e. The total bid price includes the cost of all taxes, such as, but not limited to: *[specify the applicable taxes, e.g. (i) value added tax (VAT), (ii) income tax, (iii) local taxes, and (iv) other fiscal levies and duties],* which are itemized herein and reflected in the detailed estimates,

f. Our Bid shall be valid within the a period stated in the PBDs, and it shall remain binding upon us at any time before the expiration of that period;

g. If our Bid is accepted, we commit to obtain a Performance Security in the amount of *[insert percentage amount]* percent of the Contract Price for the due performance of the Contract, or a Performance Securing Declaration in lieu of the the allowable forms of Performance Security, subject to the terms and conditions of issued GPPB guidelines[1] for this purpose;

h. We are not participating, as Bidders, in more than one Bid in this bidding process, other than alternative offers in accordance with the Bidding Documents;

i. We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed; and

j. We understand that you are not bound to accept the Lowest Calculated Bid or any

---

[1] currently based on GPPB Resolution No. 09-2020

other Bid that you may receive.

k. We likewise certify/confirm that the undersigned, is the duly authorized representative of the bidder, and granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for the [Name of Project] of the [Name of the Procuring Entity*]*.

l. We acknowledge that failure to sign each and every page of this Bid Form, including the Bill of Quantities, shall be a ground for the rejection of our bid.

Name: _____

Legal Capacity: _____

Signature: _____

Duly authorized to sign the Bid for and behalf of: _____

'Date: _____

Contract Agreement Form for the Procurement of Infrastructure Projects (Revised)

[not required to be submitted with the Bid, but it shall be submitted within ten (10) days after receiving the Notice of Award]

CONTRACT AGREEMENT

THIS AGREEMENT, made this *[insert date]* day of *[insert month]*, *[insert year]* between *[name and address of PROCURING ENTITY]* (hereinafter called the "Entity") and *[name and address of Contractor]* (hereinafter called the "Contractor").

WHEREAS, the Entity is desirous that the Contractor execute *[name and identification number of contract]* (hereinafter called "the Works") and the Entity has accepted the Bid for *[contract price in words and figures in specified currency]* by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents as required by the 2016 revised Implementing Rules and Regulations of Republic Act No. 9184 shall be deemed to form and be read and construed as part of this Agreement, *viz.*:
   - **a.** Philippine Bidding Documents (PBDs);
     - i. Drawings/Plans;
     - ii. Specifications;
     - iii. Bill of Quantities;
     - iv. General and Special Conditions of Contract;
     - v. Supplemental or Bid Bulletins, if any;
   - **b.** Winning bidder's bid, including the Eligibility requirements, Technical and Financial Proposals, and all other documents or statements submitted;

     Bid form, including all the documents/statements contained in the Bidder's bidding envelopes, as annexes, and all other documents submitted (*e.g.*, Bidder's response to request for clarifications on the bid), including corrections to the bid, if any, resulting from the Procuring Entity's bid evaluation;
   - **c.** Performance Security;
   - **d.** Notice of Award of Contract and the Bidder's conforme thereto; and
   - **e.** Other contract documents that may be required by existing laws and/or the Procuring Entity concerned in the PBDs. **Winning bidder agrees that additional contract documents or information prescribed by the GPPB that are subsequently required for submission after the contract**

execution, such as the Notice to Proceed, Variation Orders, and Warranty Security, shall likewise form part of the Contract.

3. In consideration for the sum of *[total contract price in words and figures]* or such other sums as may be ascertained, *[Named of the bidder]* agrees to *[state the object of the contract]* in accordance with his/her/its Bid.

4. The *[Name of the procuring entity]* agrees to pay the above-mentioned sum in accordance with the terms of the Bidding.

IN WITNESS whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

[Insert Name and Signature]
[Insert Signatory's Legal Capacity]

for:
[Insert Procuring Entity]

[Insert Name and Signature]
[Insert Signatory's Legal Capacity]
for:
[Insert Name of Supplier]

ACKNOWLEDGEMENT

REPUBLIC OF THE PHILIPPINES)
_____) S.S.

BEFORE ME, a Notary Public for and in City of _____, Philippines, this _____day of _____, 20__, personally appeared:

NAME	**ID ISSUED AT/ON**
_____	_____

known to me and known to be the same person who execute the foregoing instrument consisting of _____ (__) pages, including the page whereon the acknowledgments is written and acknowledged before me that the same is his/her free and voluntary act and deed and that of the Corporation/Sole Proprietorship he/she represents.

WITNESS MY HAND AND NOTARIAL SEAL, at the place and on the date first above written.

Doc No. _____;
Page No._____:
Book No._____;
Series of 20__.

Omnibus Sworn Statement

REPUBLIC OF THE PHILIPPINES)
CITY/MUNICIPALITY OF _____) S.S.

AFFIDAVIT

I, *[Name of Affiant]*, of legal age, *[Civil Status]*, *[Nationality]*, and residing at *[Address of Affiant]*, after having been duly sworn in accordance with law, do hereby depose and state that:

1. ***Select one, delete the other:***

   If a sole proprietorship: I am the sole proprietor or authorized representative of *[Name of Bidder]* with office address at *[address of Bidder]*;

   If a partnership, corporation, cooperative, or joint venture: I am the duly authorized and designated representative of *[Name of Bidder]* with office address at *[address of Bidder]*;

2. ***Select one, delete the other:***

   If a sole proprietorship: As the owner and sole proprietor, or authorized representative of *[Name of Bidder]*, I have full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for *[Name of the Project]* of the *[Name of the Procuring Entity], as shown in the attached duly notarized Special Power of Attorney*;

   If a partnership, corporation, cooperative, or joint venture: I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for *[Name of the Project]* of the *[Name of the Procuring Entity],* as shown in the attached *[state title of attached document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable;)]*;

3. *[Name of Bidder]* is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board, **by itself or by relation, membership, association, affiliation, or controlling interest with another blacklisted person or entity as defined and provided for in the Uniform Guidelines on Blacklisting;**

4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

5. *[Name of Bidder]* is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. ***Select one, delete the rest:***

   If a sole proprietorship: The owner or sole proprietor is not related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

   If a partnership or cooperative: None of the officers and members of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

   If a corporation or joint venture: None of the officers, directors, and controlling stockholders of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

7. *[Name of Bidder]* complies with existing labor laws and standards; and

8. *[Name of Bidder]* is aware of and has undertaken the following responsibilities as a Bidder:

   a) Carefully examine all of the Bidding Documents;

   b) Acknowledge all conditions, local or otherwise, affecting the implementation of the Contract;

   c) Made an estimate of the facilities available and needed for the contract to be bid, if any; and

   d) Inquire or secure Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.

9. *[Name of Bidder]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

10. In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.

IN WITNESS WHEREOF, I have hereunto set my hand this __ day of ___, 20__ at _____, Philippines.

_____
Bidder's Representative/Authorized Signatory

SUBSCRIBED AND SWORN to before me this ___ day of *[month] [year]* at *[place of execution],* Philippines. Affiant/s is/are personally known to me and was/were identified by me through competent evidence of identity as defined in the 2004 Rules on Notarial Practice (A.M. No. 02-8-13-SC). Affiant/s exhibited to me his/her [insert type of government identification card used], with his/her photograph and signature appearing thereon with no. _____issued on ____ at _____.

Witness my hand and seal this ___ day of *[month] [year]*.

NAME OF NOTARY PUBLIC
Serial No. of Commission _____

Notary Public for _____ until _____
Roll of Attorneys No. _____
PTR No._____*[date issued], [place issued]*
IBP No._____ *[date issued], [place issued]*

Doc. No. _____
Page No. _____
Book No. _____
Series of _____

BID SECURING DECLARATION FORM

REPUBLIC OF THE PHILIPPINES)
CITY OF _____) S.S.

BID SECURING DECLARATION
Project Identification No.: *[Insert number]*

To: *[Insert name and address of the Procuring Entity]*

I/We, the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid Securing Declaration.

2. I/We accept that: (a) I/we will be automatically disqualified from bidding for any procurement contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order; and, (b) I/we will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by the procuring entity for the commission of acts resulting to the enforcement of the bid securing declaration under Sections 23.1(b), 34.2, 40.1 and 69.1, except 69.1(f),of the IRR of RA No. 9184; without prejudice to other legal action the government may undertake.

3. I/We understand that this Bid Securing Declaration shall cease to be valid on the following circumstances:

    a. Upon expiration of the bid validity period, or any extension thereof pursuant to your request;

    b. I am/we are declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) I/we failed to timely file a request for reconsideration or (ii) I/we filed a waiver to avail of said right; and

    c. I am/we are declared the bidder with the Lowest Calculated Responsive Bid, and I/we have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, I/We have hereunto set my/our hand/s this ____ day of *[month] [year]* at *[place of execution]*.

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]
[Insert signatory's legal capacity]
Affiant

SUBSCRIBED AND SWORN to before me this ___ day of *[month] [year]* at *[place of execution],* Philippines. Affiant/s is/are personally known to me and was/were identified by me through competent evidence of identity as defined in the 2004 Rules on Notarial Practice (A.M. No. 02-8-13-SC). Affiant/s exhibited to me his/her [insert type of government identification card used], with his/her photograph and signature appearing thereon, with no. _____ issued on ____ at _____.

Witness my hand and seal this ___ day of *[month] [year]*.

NAME OF NOTARY PUBLIC
Serial No. of Commission _____
Notary Public for _____ until _____
Roll of Attorneys No. _____
PTR No. _____ *[date issued], [place issued]*
IBP No. _____ *[date issued], [place issued]*

Doc. No. _____
Page No. _____
Book No. _____
Series of _____

STATEMENT OF ALL ON-GOING GOVERNMENT AND PRIVATE CONTRACTS

Kindly supply the required information in the spaces provided.

Name of Bidder _____. Invitation to Bid Number ____. Page __ of __.

Name of Contract/Location/ Project/Contract Cost	a. Owner Name b. Address c. Telephone Nos.	Nature of work	Contractor's Role		a. Contract Duration b. Date Started c. Date of Completion	% of Accomplishment		Value of Outstanding Works
			Description	%		Planned	Actual	
Government:								
Private:								
							Total Cost:	

_____ _____

[Printed Name & Signature of the Authorized Rep.] *[in the capacity of] (Please indicate position of Authorized Rep.)]*

Duly authorized to sign Bid for and on behalf of _____ *Date:* _____

(Please indicate name of company)

NOTE:

The aforesaid statement should include those contracts awarded but not yet started.

Further, bidders should indicate "None" or "No On-going Government and/or Private Contracts" if they do not have any on-ongoing government and/or private contracts in the corresponding rows and/or column, including contracts awarded but not yet started, whether similar or not similar in nature and complexity to the contract to be bid.

STATEMENT OF THE SINGLE LARGEST COMPLETED CONTRACT

Kindly supply the required information in the spaces provided.

Name of Bidder _____. Invitation to Bid Number ___. Page __ of ___.

Name of the Contract	Date of the Contract	Contract Duration	Owner's Name and Address	Contact Person and Contact Details (Tel./Cell No. and/or Email Address)	Nature of Work	Amount of Contract adjusted by the bidder to current prices using PSA's consumer price index, if necessary for purposes of meeting the SLCC requirement;	Date of Completion

_____ _____

[Printed Name & Signature of the Authorized Rep.] *[in the capacity of] (Please indicate position of Authorized Rep.)]*

Duly authorized to sign Bid for and on behalf of _____ *Date:* _____

(Please indicate name of company)

NOTE:

Bidders shall submit and attach a copy of the end-user's acceptance or official receipt(s) or sales invoice.

DETAILED COST ESTIMATE
CONSTRUCTION OF COAST GUARD LIGHT STATION CONRADA

Kindly supply the required information in the spaces provided.

Name of Bidder _____. Invitation to Bid Number _____. Page __of ___.

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	ESTIMATED DIRECT COST				MARK-UPS IN PERCENT		TOTAL MARK-UP		VAT	TOTAL INDIRECT COST	TOTAL COST	UNIT COST
				MATERIAL	LABOR	EQUIPMENT	TOTAL	OCM	PROFIT	%	VALUE				
(1)	(2)	(3)	(4)	(5.1)	(5.2)	(5.3)	(5) (5.1) + (5.2) + (5.3)	(6)	(7)	(8) (6) + (7)	(9) (5) X (8)	(10) 12% ((5)+(9))	(11) (9)+(10)	(12) (5)+(11)	(13) (12)/(3)
	TOTAL COST														

_____ _____

[Printed Name & Signature of the Authorized Rep.] *[in the capacity of] (Please indicate position of Authorized Rep.)]*

Duly authorized to sign Bid for and on behalf of _____ *Date:* _____
(Please indicate name of company)

NFCC COMPUTATION

Kindly supply the required information in the spaces provided.

Name of Bidder _____. Invitation to Bid Number __. Page _ of ___.

LOT NO.	DESCRIPTION	ABC
1	Design and Build for Construction of Light Station Conrada	**One Hundred Ninety-Four Million Eight Million Two Hundred Fifty-Five Thousand Six Hundred Thirty-one Pesos and 02/100 (PhP8,255,631.02).**

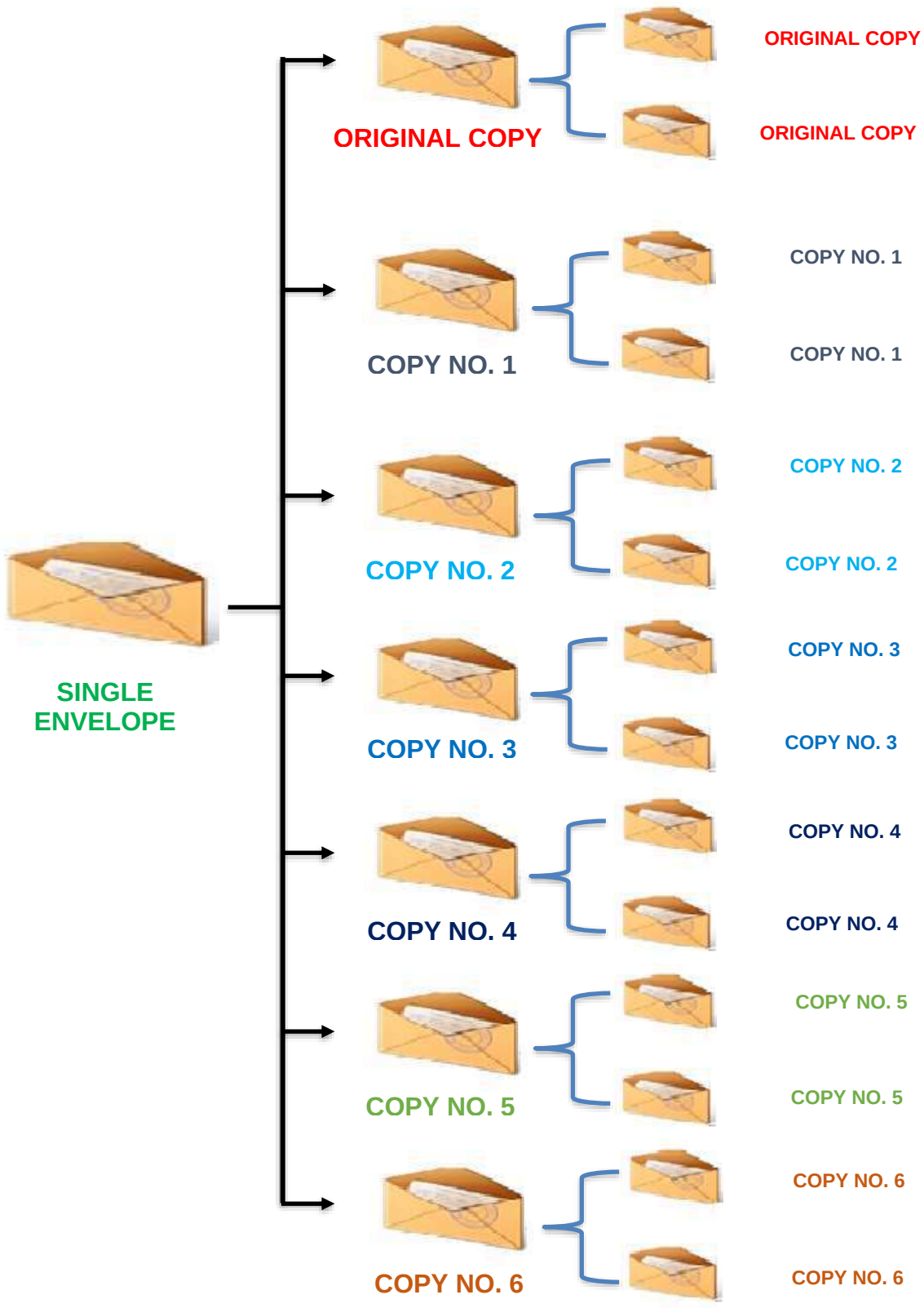
DETAILS	AMOUNT
Current Assets	
Minus	
Current Liabilities	
Difference of Current Assets and Current Liabilities	
Multiplied by	
K	15
Total (Product)	
Minus	
Total value of all outstanding contracts, including those awarded but not yet started	
Total NFCC Computation	

_____ _____

[Signature of the Authorized Rep.] [in the capacity of] (Please indicate position of Authorized Rep.)]

Duly authorized to sign Bid for and on behalf of _____
(Please indicate name of company)

DIAGRAM FOR THE SEALING AND MARKING OF BIDS




Republic of the Philippines
gppb
Government Procurement Policy Board


Republic of the Philippines
gppb
Government Procurement Policy Board

Philippine Coast Guard
HEADQUARTERS COAST GUARD LOGISTICS SYSTEM COMMAND
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE
CBGF, Muelle Dela Industria Compound, Binondo
1006 Manila

SCOPE OF WORKS & TECHNICAL SPECIFICATIONS

CONSTRUCTION OF COAST GUARD LIGHTSTATION HILONGOS

BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE

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GENERAL REQUIREMENTS

PART A - FACILITIES FOR THE PCG ENGINEER

PART A - FACILITIES FOR THE PCG ENGINEER

1.1 SCOPE OF WORK

This section shall include the mobilization and demobilization of Contractor's plant, equipment, materials and employee to the site; construction and maintenance of PCG Engineer's (including PCG Engineer's Representative) staff house, maintenance of existing field office and facilities; compliance with the contract requirements, and provision for the health/safety and environmental protection during the entire project duration.

This section shall include the furnishing of labor, materials, transportation, tools, supplies, plant, equipment and appurtenances to complete satisfactorily the construction of the proposed project.

1.2 MOBILIZATION AND DEMOBILIZATION

The Contractor upon receipt of the Notice-to-Proceed shall immediately mobilize and transport his plant, equipment, materials and labor forces to the site and demobilize or remove the same at the completion of project and level/ clear the site acceptable to the PCG Engineer and the Owner.

Mobilization and Demobilization are incidental to other items of work and will not be measured for payment.

1.3 FACILITIES FOR THE PCG ENGINEER AND PCG ENGINEER'S REPRESENTATIVE

1.3.1 Office and Staff House for the PCG Engineer

During the performance of the contract, the Contractor shall construct and maintain an office for the PCG Engineer and PCG Engineer's representative within the site of the work at designated location indicated on the Drawings while the work is in progress.

The Contractor shall also maintain the existing field office at Site, existing staff house for the PCG Engineer.

The field office at the Site and Office for the PCG Engineer's representative shall have a 24-hour security services and shall strictly comply with the provisions of Batas Pambansa 344 (Accessibility Law) and the Building National Code.

All facilities to be provided by the Contractor shall conform to the best standard for the required types. The facilities provided by the Contractor including utilities and communication facilities shall revert to the Government including office equipment, apparatus, and furniture's. upon completion of the Project, unless otherwise specified in the Contract Documents.

The Contractor shall be responsible for the maintenance and protection of all facilities to be provided during the entire duration of the Contract including provision of adequate stock of all expendable items, such as light bulbs, light tubes, equipment and supplies, at all times to ensure proper and continuous functioning of all the PCG Engineer's facilities.

It shall be understood that if the Contractor cannot provide the articles as described or intends to supply equivalent substitutes, the PCG Engineer may execute their availability and the Contractor shall pay therefore as certified by the PCG Engineer or the PCG Engineer shall have the right to deduct the sums from any money which is due or which will become due to the Contractor.

Construction shanties, sheds and temporary facilities provided as required for the Contractor's convenience shall be maintained in good condition and neat appearance including finishes as required by the PCG Engineer.

1.3.2 Temporary Light and Power

The Contractor shall provide and maintain temporary electrical service including installation of temporary power and lighting within the construction site and facilities constructed thereat. The electrical services shall be adequate in capacity to supply power to construction tools and equipment without over-loading the temporary facilities and shall be made available to supply power, lighting and construction operations of all trades. All temporary equipment and wiring for power and lighting shall be in accordance with the applicable provisions of the local governing codes. At the completion of the construction work, all temporary wiring, lighting, equipment and devices shall be removed.

1.3.3 Temporary Toilets

The Contractor shall provide and maintain in sanitary condition enclosed toilets for the use of all construction personnel located within the contract limits, complete with fixtures, water and sewer connections and all appurtenances. Installation shall be in accordance with all applicable codes and regulations of the local authorities having jurisdiction thereof. Upon completion of the work, temporary toilet and their appurtenances shall be removed.

1.3.4 Temporary Water Service

The Contractor shall provide and maintain temporary water supply service, complete with necessary connections and appurtenances. Installed water supply lines shall be used as a source of water for construction purposes subject to the approval of the PCG Engineer. The Contractor shall pay the cost of operation, maintenance and restoration of the water system. All temporary water service including equipment and piping shall be removed upon completion of the work and all worn out and damaged parts of the permanent system shall be replaced and restored in first class condition equal to new. Security

The Contractor shall provide sufficient security in the construction site to prevent illegal entry or work damaged during nights; holidays and other period when work is not executed; and during working hours. The Contractor shall take ample precautions against fire by keeping away flammable materials, and ensure that such materials are properly handled and stored. Fires shall not be allowed within the area of construction, except when permitted by the PCG Engineer.

1.3.5 Disposal Area

The proposed location of disposal area shall be at the site designated by the PCG Engineer. It is the responsibility of the Contractor to disposed off-site all construction debris and be considered in the preparation of his proposal.

1.3.6 Contractor's Key Personnel and Maintenance Staff to be assigned to the Project:

SCHEDULE A.1 - MAINTENANCE OF OFFICE FOR THE PCG ENGINEER'S REPRESENTATIVE

REF. NO.	DESCRIPTION	Qty	Unit
I.	**Operation/Maintenance Staff for the PCG Engineer's Representative (Monthly)**		
a.	Clerk/Encoder	1	no.
b.	Utility	1	no.
c.	Security Guard	1	no.

II	Key Personnel (on-full time basis) / Monthly	Qty	Unit
d.	Project Manager (Licensed Engineer)	1	no.
e.	Project Engineer (Licensed Civil Engineer)	1	no.
f.	Material Engineer (Accredited Materials Engineer)	1	no.
g.	Foreman	1	no.
h.	Safety Engineer (Certified by the Bureau of Working Conditions of DOLE or with Certificate of Training in Occupational Safety and Health)	1	no.
Note: Payment for the above key personnel (d) to (l) are incidental to items of the permanent works, hence, will not be measured and paid separately. However, Safety Officer is included under Pay-item No. B.2 (Construction Health and Safety) of the Bill of Quantities.			
III.	**Miscellaneous (Monthly)**	**Qty**	**Unit**
a.	Water Bill	**5**	**mos.**
b.	Electric Bill	**5**	**mos.**

SCHEDULE A.2 - MAINTENANCE OF STAFF HOUSE FOR THE PCG ENGINEER

REF. NO.	DESCRIPTION	Qty	Unit
I.	**Miscellaneous (Monthly)**		
a.	Water Bill	**5**	**mos.**
b.	Electric Bill (including replacement of defective lighting fixtures)	**5**	**mos.**

SCHEDULE A.3 - MAINTENANCE OF FIELD OFFICE FOR THE PCG ENGINEER AND PCG ENGINEER'S REPRESENTATIVE

REF. NO.	DESCRIPTION	Qty	Unit
I.	**Miscellaneous (Monthly)**		
a.	Water Bill	**5**	**mos.**
b.	Electric Bill (including replacement of defective lighting fixtures)	**5**	**mos.**

1.4 ITEMS TO BE CONSIDERED FOR THE FACILITIES FOR THE PCG ENGINEER (INCLUDING PCG ENGINEER'S REPRESENTATIVE)

The Contractor shall provide and maintain the field office, office (satellite) and staff house for the PCG Engineer and PCG Engineer's representative but not limited to the items specified below.

1.4.1 Site Office, Office (Satellite) and Staff House for the PCG Engineer and PCG Engineer's Representative

By way of maintenance, the Contractor shall provide the necessary personnel specified under **Schedule A.1** to maintain all of the facilities in good operating condition and adequately safeguard and secure the building, equipment and property day and night, regularly and properly cleaned, and to take care household helps, all as directed and approved by the PCG Engineer. The Contractor, if requested by the PCG Engineer, shall immediately replace assigned personnel for reasons arising from misconduct and/or unsatisfactory performance.

All test and quality control works shall be done by the Contractor's Materials Testing and Laboratory Staff under the direct supervision of the PCG Engineer/PCG Engineer's representative. The Contractor shall make all necessary arrangements for the supply and delivery of samples to, and collection of samples from such laboratory. He shall arrange for one copy of the independent testing laboratory's test certificate to be delivered to the PCG Engineer not less than three days before the materials covered by the relevant test certificate are incorporated into the works, and the test certificate shall be related to the materials from which the samples were taken. It shall be reiterated that all test and quality control works shall be the responsibility of the Contractor. The PCG Engineer shall define from the beginning of the works, and in accordance with the Specifications, all tests to be performed for each kind of materials and/or works, together with the corresponding frequencies to be used and amend such statement from time to time during the progress of work if deemed necessary. The Contractor shall be responsible for all the laboratory material testing necessary in the project implementation. Expenses shall be incorporated in the contractor's overhead cost and shall not be considered as pay-item.

If the Contractor cannot provide the articles on time, the PCG Engineer shall secure the items and the Contractor shall immediately reimburse the PCG Engineer for the cost thereof.

During the period of maintenance of all the buildings, the Contractor shall provide with a 24-hour supply of potable water, electricity and other services. The Contractor shall pay all bills for water, electricity, and other services.

The Contractor shall be responsible for replacing and/or restoring, as directed, any facility or parts thereof which become damaged from any cause, or become worn out, lost, misplaced or stolen. The Contractor shall also provide stocks of expendable items such as light bulbs and tubes, insecticides, fuel, lubricants and the like.

The site office, office and staff house, furniture's and fixtures, office equipment like air-con units and temporary power, equipment and computer system shall become the property of the Procuring Entity upon their payment.

1.4.2 Maintenance of Communication Facilities for the PCG Engineer and PCG Engineer's Representative

The Contractor shall maintain the existing communication facilities for the exclusive use of the PCG Engineer and PCG Engineer's Representative as listed in **Schedule C** within the required number of months during the Project implementation as specified in the Bill of Quantities. Should the specified number of months be insufficient to cover the period until Project completion, said period of maintenance of said communication facilities shall be extended upon approval of the PCG Engineer.

In order to have continuous operation and efficient maintenance of the equipment, the Contractor shall provide monthly operating expenses including cost for servicing and minor repairs.

1.4.3 Photographs

The Contractor shall provide record progress photographs (120 photographs per month) taken as, when and where directed by the PCG Engineer at intervals of not more than one month. The photographs shall be sufficient in number and location to record the exact progress of the works. The Contractor shall provide photograph in electronic file to the PCG Engineer. The photographs retained by the PCG Engineer will become the property of the Procuring.

1.4.4 As-Built Drawings

The contractor shall prepare and submit as-built plans duly signed and sealed by appropriate PCG Engineer in the same sheet size and scale as the original drawings in five (5) reproducible copies. Electronic copies of the as-built contract drawings shall also be submitted in native files for use with the Autodesk software AutoCAD and Revit. The *.PDF format files shall be delivered with the CAD or BIM files.

No separate payment for the As-built Drawings as this is deemed to be included as incidental to other items of work.

1.5 MEASUREMENT AND PAYMENT

1.5.1 Measurement

a) Office for the PCG Engineer

(1) Maintenance of Office for the PCG Engineer's

The maintenance of office for the PCG Engineer's shall include monthly salaries and wages of the maintenance personnel, Assistance to the PCG Engineer's representative including provision of security, water and electricity 24 hours daily, repair of office and shall be paid the date the PCG Engineer's representative's occupancy reckoned from the commencement of the Works until completion of the contract. Refer to **Schedule A**.1. Unit of measurement and payment is "lump sum".

(2) Furnish Equipment, Furniture, Fixtures, Office Equipment and Appliances for the PCG Engineer and PCG Engineer's Representative

The quantities for the provision of equipment, furniture/fixtures, office equipment and appliances for the PCG Engineer & PCG Engineer's representative, shall be the number of each type of equipment, furniture/fixtures, office equipment and appliances supplied and as listed in **Schedule B**. This item shall be paid at the "Lump Sum" price upon delivery of equipment, furniture/fixtures, and appliances, and upon its approval/acceptance by the PCG Engineer.

b) Operate and Maintain Communication Equipment for the PCG Engineer

This item consists of the maintenance of existing communication equipment as specified in Subsection 1.4.2 which includes provision and maintenance of (a) monthly fee for telephone landline with internet and (b) cellular phone prepaid cards worth Php500.00 each per month. Refer to **Schedule C**. The unit of measurement and payment is at the "per Month", until completion of the Project.

1.5.3 Payment

Payment shall be made under the following pay items included in the Bill of Quantities. Such payments shall be full compensation for furnishing, maintaining and insuring against loss of the facilities and equipment specified including removal and restoration of the site(s). The requirement that ownership of facilities shall revert to the government shall not apply if such facilities are provided on rental basis under terms approved by the Procuring Entity.

SCHEDULE B - EQUIPMENT, FURNITURES, FIXTURES, OFFICE EQUIPMENT AND APPLIANCES FOR THE LABORATORY BUILDING FOR THE PCG ENGINEER AND PCG ENGINEER'S REPRESENTATIVE (ALL ITEMS SHALL BE APPROVED BY THE PCG ENGINEER)

I. Description	Qty	Unit
FURNITURE (Office, Receiving/Lobby/Conference, Laboratory and Front Desk)		
Office Desk, standard, 70 cm x 120 cm, with 3 drawers on each side and center drawer provided with locks and keys	2	each
Standard revolving chairs, screw type with pneumatic height adjustment	2	each
Mobile steel cabinet, 3 layer	2	each

I. Description	Qty	Unit
OFFICE EQUIPMENT AND SUPPLIES		
Air conditioners, window mounted type, 1.0 HP (for office)	1	set
Laptop computer, Windows 11 Home; Intel® Core™ i7-14650HX processor Hexadeca-core; NVIDIA® GeForce RTX™ 4060 with 8 GB dedicated memory; 16" WUXGA (1920 x 1200) 16:10 IPS 165 Hz; 16 GB, DDR5 SDRAM; 1 TB SSD	2	set
Portable Printer Deskjet or equivalent compatible with the personal computer, for both manual A4 and A3 paper	1	set
PANTRY/TOILET		
Hot and Cold Water Dispenser (5 gallons)	1	each
Electric Kettle, Aluminum (Commercial Type)	1	set
Set of kitchenware for at least 5 persons consisting of the following: spoons, forks, knives, drinking glass, cup and saucers, serving plates, placemats, table cloths, rice plates, pitchers. Canisters, serving bowls, bolos, dust pans, waste baskets and others	1	set
Doormat, rugs, brooms, dust pan, garbage cans, and gloves	1	Lump Sum

SCHEDULE C – MAINTENANCE OF COMMUNICATION EQUIPMENT FOR THE PCG ENGINEER AND PCG ENGINEER'S REPRESENTATIVE (ALL ITEMS SHALL BE APPROVED BY THE PCG ENGINEER)

DESCRIPTION	QTY.	UNIT
Equipment		
A. Telephone Landline with internet (Subscription and Installation Fee inclusive)	5	Month
B. Cellular Phone		
Prepaid cards for 2 cellular phones worth Php2000 each	5	month

SCHEDULE D - PROVISION OF SUPPLIES AND CONSUMABLE STORES FOR THE PCG ENGINEER

REF NO.	DESCRIPTION	QTY.	UNIT
a)	**OFFICE SUPPLIES (to be supplied during the first month only)**		
1.	Desk Paper Organizer Trays	2	each
2.	First Aid Kit	1	each
3.	Heavy Duty Flashlights	2	each
4.	Heavy Duty Cutter	1	each
5.	Mechanical Pencil	5	each
6.	Pencil Sharpener (Table Mounted)	1	each
7.	Puncher	4	each
8.	Record Book, 100 pages	3	each
9.	Scissor	1	each
10.	Stainless Erasing Shield	2	each
11.	Stamp Pad with Ink	2	each
12.	Staple Wire Remover, Special	2	each
13.	Stapler, Max HD 12N/70, Cap. 30 to 170 sheets	2	each
14.	Stapler, Max HD 50, standard #35 staple wire	2	each
15.	Steel Ruler,12inch	1	each
16.	Tape Dispenser	2	each

REF NO.	DESCRIPTION	QTY.	UNIT
17.	Waste Paper Bins	1	each
18.	Whiteboard, 1200 mm x 1200 mm	1	each
b)	**OFFICE SUPPLIES (Monthly)**		
19.	Ballpen (Black, Red, Blue)	2	each
20.	Bond Paper Long	1	ream
21.	Bond Paper, A3 size	1	ream
22.	Bond Paper, A4 size	2	ream
23.	Brown Envelope, Long	2	each
24.	Brown Envelope, Short	2	each
25.	Expanded Envelope, Long	2	each
26.	Fastener	2	box
27.	Folder, Long	2	each
28.	Folder, Short	2	each
29.	Glue Stick, 20 grams	1	each
30.	Ink Eraser	1	each
31.	Inkjet Cartridge, Black	1	each
32.	Inkjet Cartridge, Tri-colour	1	each
33.	Letter Envelope, brown	0.50	box
34.	Letter Envelope, white	0.50	box
35.	Magic Tape (18mm x 50mm)	1	roll
36.	Marker, Stabilo (assorted colors)	1	box
37.	Masking Tape	1	roll
38.	Mini Correction Roller, 6m	1	each
39.	Paper Clip	1	box
40.	Scotch Tape (3/4")	1	roll
41.	Sign pen (Black, Red, Blue)	2	each

REF NO.	DESCRIPTION	QTY.	UNIT
42.	Staple wire Special	0.1	box
43.	Staple Wire, normal size #35	1	box
44.	Technical Pen Ink	1	bottle
45.	Whiteboard Eraser	1	each
	Whiteboard Marker, assorted colors	1	each
	Yellow Paper, Rule	1	pad
c)	**CONSUMABLE STORES (Monthly)**		
49.	Battery	1	each
50.	Broom	1	each
51.	Dust Pan	1	each
52.	Floor Mop (Set Handle with Mophead)	1	set
53.	Fluorescent Tube 20-40 watts	1	each
54.	Insect spray	1	each
55.	Toilet Deodorant	1	each
56.	Toilet Paper	3	each
57.	Toilet Soap	1	Each

1.6 COMPLIANCE WITH CONTRACT REQUIREMENTS

1.6.1 Control of on Site Construction

Prior to the start of any definable feature of the work, the Contractor must perform the necessary inspection to include as follows:

a) Review of Contract Documents to make sure that materials, equipment and products have been tested, submitted and approved.

b) Physical examination of materials and equipment to assure its conformity to the specifications, plans, shop drawings and other data.

c) As soon as the work has been started the Contractor shall conduct initial inspection to check and review the workmanship in compliance with the contract requirements for a particular item of work.

d) The Contractor shall perform these inspections on a regular basis to assure continuing compliance with the contract requirements until completion of a particular type of work.

1.6.2 Preconstruction Meetings

Prior to the start of construction, Contractor's material men or vendors whose presence are required, must attend preconstruction meetings as directed for the purpose of discussing the execution of work.

1.6.3 Progress Meetings

Progress meetings shall be called upon by the following for the purpose of discussing the implementation of the work:

When called upon by the PCG Engineer or the PCG Engineer's representative for the purpose of discussing the execution of work. Contractor's material men or vendors whose presence is necessary or requested must attend progress meetings. Each of such meeting shall be held at the time and place designated by the PCG Engineer or his representative. Decisions and instructions agreed on these meetings shall be binding and conclusive on the contract. Minutes of this meeting shall be recorded and reasonable number of copies shall be furnished to the Contractor for distribution to various materials men and vendors involved.

The Contractor may also call for a progress meeting for the purpose of coordinating, expediting and scheduling the work. In such meeting Contractor's material men or vendors, whose presence is necessary or requested are required to attend.

1.6.4 Progress Reports

The Contractor shall faithfully prepare and submit progress reports to the PCG Engineer every 30 days after the start of the project up to its completion, showing the work completed, work remaining to be done, the status of construction equipment and materials at the site.

1.6.5 Survey Data

The Contractor shall layout his work from established based lines and bench mark indicated in the drawing and shall be responsible for all measurement in connection therewith. The Contractor shall furnish, at his own expense, all stakes, templates, platforms, equipment, tools, materials and labor as may be required in laying out any part of the work, out of established base lines and bench mark. It shall be the responsibility of the Contractor to maintain and preserve all stakes and other marks until he is authorized to remove them. If such marks are destroyed by the Contractor through his negligence prior to the authorized removal, they shall be replaced at the expense of the Contractor.

1.6.6 Shop Drawings

The Contractor shall submit and furnish shop drawings and samples accompanied with transmittal forms in accordance with the provision of the Conditions of Contract. The term "Shop Drawings" as used herein shall be understood to include detailed design calculations, construction drawings, lists, graphs, and others.

a) Transmittal forms shall be filled out in type-written or ink with no alterations or interlineations unless initialed and dated before submittal. Shop drawings shall be submitted the same size as the contract drawings when practicable, but in no case it shall exceed dimension of the contract drawings. The Contractor shall make preliminary check of all shop drawings for compliance with the contract documents and he shall stamp each print with statement of compliance with the requirements. The Contractor may authorize his supplier to deal directly with the PCG Engineer/PCG Engineer's representative with regard to shop drawings, however, ultimate responsibility for accuracy and completeness in the submittal shall remain with the Contractor.

b) The said shop drawing and transmittal shall be submitted at a time sufficiently early, to allow review of the same by the PCG Engineer/PCG Engineer's representative and to accommodate the rate of construction progress required under the contract. The contractor shall submit print copies of shop drawings with transmittal forms, and copies of brochures with transmittal forms, as required by the PCG Engineer.

c) Any shop drawings and samples, submitted not accompanied by transmittal forms or where all applicable items on the forms are not completed will be returned for re-submittal. The PCG Engineer's representative will examine/evaluate and recommend approval of the mentioned shop drawing and endorsed it to the PCG Engineer for its approval. The PCG Engineer will retain print copy for his file and return the rest to the Contractor with notation. Returned shop drawings marked "No Exceptions Taken" or "Make Corrections Noted", means formal revision of said drawings will not be required. If it is marked "Amend-Resubmit" or "Rejected-Resubmit", the Contractor shall revise said drawing and shall submit revised drawing to the PCG Engineer.

d) The PCG Engineer shall process the submission and indicate the appropriate action on the shop drawings and transmittal forms. Construction of an item shall not commenced before the PCG Engineer has reviewed the pertinent shop drawing and returned it to the Contractor, marked as mentioned above. Revisions indicated on shop drawing shall be considered as changes necessary to meet the requirements of the contract drawings and specifications, and shall not be taken as the basis of claims for extra work. The Contractor shall have no claim for damages or extension of time due to any delay, resulting from having Contractors make the required revisions, unless reviewed by the PCG Engineer was delayed beyond reasonable period of time and unless the Contractor can establish that such delay in revision resulted in delay of the project.

Re-submittal procedure shall follow the same procedure as the initial submittal.

1.6.7 Construction Photographs

The Contractor shall take photographs during the progress of the work once a month, all taken where directed by the PCG Engineer. At the completion of the project final photographs shall be taken by the Contractor as directed by the PCG Engineer. Two prints of each photograph shall be sent to the PCG Engineer and one print to the PCG Engineer's Representative. The photographs shall be neatly labeled, dated, and identified in a little box in the lower right hand corner, showing the date of exposure, project name, location and direction of view.

All negatives shall be retained by the Contractor until completion of the work at which time they

shall become the property of the Procuring Entity.

1.6.8 Cleaning-up

The Contractor shall at all times keep the construction area including storage area used by him free from accumulations of waste material or rubbish. Upon completion of construction, the Contractor shall leave the work and premises in a clean, neat and workmanlike conditions satisfactory to the PCG Engineer.

1.6.9 Provisional Facilities

In the period of two (2) months between the start of contract time and the construction until the occupancy of the of the combined site office and testing laboratory to the PCG Engineer's representative, the Contractor shall provide provisional substitute facilities. During the said period, he shall lease spaces acceptable to the PCG Engineer's representative, for use as laboratory building in the immediate vicinity of the project. He shall provide provisional vehicles acceptable to the PCG Engineer until the specified vehicles are delivered. For the quality control of materials and the Works, testing shall be undertaken at the laboratory of the Bureau of Research and Standards of the respective DPWH Region, or at another laboratory accredited by DOST/BRS with the cost thereof for the account of the Contractor.

If the provisional facilities are not provided by the Contractor, the PCG Engineer may lease or rent such facilities and the cost thereof shall be immediately reimbursed to the PCG Engineer by the Contractor. In the event that the Contractor fails to provide the specified facilities within the specified period, the Contractor shall continue to lease or rent and maintain the provisional facilities at his expense until the specified facilities are made fully available to the satisfaction of the PCG Engineer.

The Contractor shall make all necessary arrangements for the supply and delivery of samples to, and collection of samples from such laboratory. He shall arrange for one copy of the independent testing laboratory's test certificate to be delivered to the PCG Engineer not less than three days before the materials covered by the relevant test certificate are incorporated into the works, and the test certificate shall be related to the materials from which the samples was taken. It shall be reiterated that all test and quality control works shall be the responsibility of the Contractor. The PCG Engineer shall define from the beginning of the works, and in accordance with the Specifications, all test to be performed for each kind of materials and/or works, together with the corresponding frequencies to be used and amend such statement from time to time during the progress of work if deemed necessary.

1.6.10 Documents to be Submitted

The following documents shall be submitted by the Contractor to the PCG Engineer prior to final payment and before issuance of final certificate of payment in accordance with the provisions of the conditions of contract.

a) The guarantee required by the Conditions of Contract and any other extended guarantees stated in the technical sections of the specifications.

b) A set of As-Built drawings shall be submitted showing accurate record of changes or deviations from the contract documents and the shop drawings indicating the work as actually installed. Records shall be arranged in order, in accordance with the various sections of the specifications and properly indexed with certifications of endorsement thereof, that each of the revised print of the drawings and specifications are complete and accurate. Prior to the application for final payment, and as a condition to its approval by the PCG Engineer, the Contractor shall deliver the records, drawings, and specifications arranged in proper order, indexed and endorsed as herein specified.

PART B – OTHER REQUIREMENTS

PART B - OTHER REQUIREMENTS

1.1 BILLBOARDS

The Contractor shall install one (1) Billboard measuring 1200 mm x 2400 mm (4ft x 8ft) using 12mm (1/2 inch) marine plywood or tarpaulin posted on 5mm (3/16 inch) marine plywood, in front of the Project site. Project Billboard shall be installed for government information projects to inform the public of the implementation of the project and to advise the road users of the on-going construction. See attached drawing **(Annex A).**

The Contractor shall also install one (1) Billboard per attached COA Circular No 2013-004 **(Annex B).**

Upon completion of the work, all signs installed shall be removed from the site.

1.2 OFFICE, SHOPS, STORES AND WORKMENS ACCOMMODATION FOR CONTRACTOR

The Contractor shall provide and maintain such offices stores, workshops, latrines, housing and messing accommodations as are necessary. These shall be located in the Contractor's compound, distinct and separate from the PCG Engineer's compound. The Contractor shall not be permitted to erect temporary buildings or structures on the site without the specific permission in writing of the PCG Engineer including approval of the dimensions of such buildings or structures.

The selection of the site shall be the responsibility of the Contractor and shall be approved by the PCG Engineer. It is entirely up to the Contractor to make whatever arrangements he deems necessary with landowners regarding use of land for the purpose of erecting camps, workshops, garages, stockpiling of materials, location of plants, housing of labor and staff, welfare facilities and all costs incurred in connection with rental or lease of such land shall be at the Contractor's expense.

The Contractor shall be solely responsible for the erection, maintenance and subsequent disposal of whatever facilities he deems necessary to execute the work.

The Contractor shall not erect temporary buildings or structures within the road right-of-way without the prior written approval of the PCG Engineer.

1.3 CONSTRUCTION HEALTH AND SAFETY

a) Health and Safety Plan

Within one month of his arrival on the project site, the Contractor shall submit a Health and Safety Plan/Program with operational details of his proposals to the PCG Engineer for prior approval.

b) Accident Prevention Officer; Accidents

Due precautions shall be taken by the Contractor, at his own cost, to ensure the safety and protection against accidents of all staff and labor engaged on the Works, local residents in the vicinity of the Works, and the public traveling through the Works.

The Contractor shall have on his staff on Site a designated Safety Officer qualified to promote and maintain safe working practices. This Safety Officer shall have authority to issue instructions and shall take protective measures to prevent accidents, including but not limited to, the establishment of safe working practices and the training of staff and labor in their implementation.

The Contractor shall be responsible for all costs including medical treatment, transport, and accommodation incurred by any member of the public or his labor force whether on direct contract or sub-contract as a result of injuries or illness arising from the execution of the Works.

c) Protective Clothing and Safety Equipment

The Contractor shall, at his own expense, provide protective clothing and safety equipment to all staff and labor engaged on the Works to the satisfaction of the PCG Engineer. Such clothing and equipment shall include, at a minimum, high visibility vests for workers directing traffic, protective footwear for workmen undertaking concrete mixing work, protective footwear and gloves for workmen performing paving works, dust masks, rubber boots, rain coats and otherwise as appropriate to the job on hand and to the PCG Engineer's satisfaction.

Refer to **Schedule E** below, after Sub-item d), "Medical and First Aid Facilities) for the breakdown of protective clothing and safety equipment as well as Staff to be supplied by the Contractor for the entire duration of the Project.

d) Medical and First–Aid Facilities

The Contractor shall provide and maintain throughout the duration of the Contract, a medical examining room and sickbay together with all necessary supplies and equipment to be sited in the Contractor's main camp. The rooms shall be used exclusively for medical purposes and shall be of good quality construction with electric lighting and otherwise suitable for their purpose. The sickbay shall have at least one bed, and shall be provided with adjacent washing and sanitation facilities.

The Contractor shall employ permanently on site at least one fully trained medical aide, nurse or paramedic who shall be engaged solely for medical duties.

The Contractor shall, at his own expense, provide first aid equipment at all camps and work sites to the satisfaction of the PCG Engineer, and shall ensure that at all camps and works sites where 20 or more persons are engaged on the Works there shall at all times be a person qualified in first-aid with access to appropriate first-aid equipment.

The location of the medical room and other medical and first-aid arrangements shall be made known to all employees by posting suitable notices at prominent locations around the site and by verbal instruction upon recruitment.

The Contractor's arrangements for complying with this Sub-Section shall be subject to the prior approval of the PCG Engineer and also to the approval of any qualified Medical Officer designated by the Employer to inspect or supervise medical arrangements on the Site.

SCHEDULE A –CONSTRUCTION HEALTH AND SAFETY INCLUDING MEDICAL AND FIRST AIDE FACILITIES

Description	Quantity	Unit
Labor		
Safety Officer	5	month
Safety Aide	5	month
Materials (Quantities shown below shall be supplied for the entire contract duration of 5 months)		
(a) Medical and First Aide Facilities	1	set
(b) Protective Clothing and Safety Equipment		
Protective Footwear	5	each
Hard Hats	5	each
Reflectorized Vests	5	each
Safety Glasses	5	each

e) Supply of Drinking Water, Sanitation

The Contractor shall provide on the Site at his expense, an adequate supply of drinking water for all staff and labor engaged on the Works, together with sanitary facilities (portable toilets or latrines), to the satisfaction of the PCG Engineer. The Contractor shall thoroughly disinfect and fill all latrine pits, sumps and trenches when no longer required.

Payment of the provision of construction safety and health shall be full compensation for fully satisfying the requirement of this Item to the approval of the PCG Engineer.

1.3.1 Environmental Control Provisions

The required project specific EMP shall consider amongst others, the following Environmental Provisions:

a) Environmental Protection during Construction

(1) During excavation works, the Contractor shall take all steps necessary to complete drainage and slope protection works in advance of each rainy season. Erosion or instability or sediment deposition arising from operation not in accordance with the Specification shall be made good immediately by the Contractor at his expense.

(2) Notwithstanding approval of the intended method of working, the Contractor shall at all times be responsible for constructing the earthworks in accordance with the Specifications and Drawings.

(3) The project area can experience inclement weather – fog, heavy rainfall, monsoons and earthquakes. It will be deemed that the Contractors is familiar with these conditions and has formulated his Works Program considering possible loss of time due to these causes, and it shall be the obligation of the Contractor to revise his program and enhance his construction efforts as necessary to ensure timely completion of the work schedule for each working season.

b) Revegetation of Disturbed Ground.

Where directed by the PCG Engineer, the Contractor shall establish vegetation on fill slopes, out slopes of IV: 1H or less, worked out borrow pits, and other areas which may include roadway shoulders and verges, spoil disposal areas, stockpile areas, quarries, access tracks, plant sites, camp, landslide scars, gullies and stream and river banks. Prior to placing topsoil and/or establishing vegetation on embankments, all fill material not compacted to the required standards shall be removed from the side slopes.

The Contractor shall be responsible for supplying sufficient planting material to carry out all revegetation works, and shall establish and operate plant nurseries as necessary and shall make his own arrangements for procuring cutting, slips and seed for growing.

Prevention of Air and Water Pollution

The Contractor shall ensure that his activities do not result in any contamination of land or water by polluting substances. He shall implement physical and operational measures such as earth bunds of adequate capacity around fuel, oil and solvent storage tanks and stores, oil and greases traps in drainage systems from workshops, vehicle and plant washing facilities and service and fuelling areas and kitchens, the establishment of sanitary solid and liquid waste disposal systems, the maintenance in effective condition of these measures, the establishment of emergency response procedures for pollution, events, and dust suppressions, all in accordance with normal good practice and to the satisfaction of the PCG Engineer.

To prevent water pollution caused by disposal of domestic sewage from the worker's camp, temporary toilet facilities shall be installed within the construction area to provide the sanitation requirements of workers. These units shall be kept clean and sanitary at all times.

Should any pollution arise from the Contractor's activities including the improper deposition of sediment he shall clean up the affected area immediately at his own cost and to the satisfaction of the PCG Engineer, and shall pay full compensation to any affected parties.

Air pollution will be mitigated through dust control on the street and at the stock pile of aggregates. This shall be implemented through regular water sprinkling of the stockpile of aggregates and soil.

Maintenance of equipment, scheduled calibration of fuel injection pumps and the use of emission control devices are expected to help reduce the volume of exhaust emissions.

The stand-by diesel engine generator set of the project will be regularly maintained to prevent emission of air pollutants. The said generator set should have a Permit to Operate from the DENR-EMB in accordance with the requirements of the Philippine Clean Air Act.

c) Protection of Trees and Vegetation

Unless otherwise provided in the Specifications, the Contractor shall ensure that no trees or shrubs or are felled or harmed except for those required to be cleared for execution of the Works. The Contractor shall protect trees and vegetation from damage to the satisfaction of the PCG Engineer. The Contractor shall be responsible for obtaining any necessary felling permits and for ensuring the disposal of felled trees in accordance with prevailing regulations. Endangered species shall be identified, and the Contractor will follow any special provisions in the EMP or DENR permits regarding the potential removal of endangered species. No trees shall be removed without the prior approval of the PCG Engineer and any competent authorities. Should the Contractor become aware during the period of the Contract that any tree or trees designated for

clearance have cultural or religious significance he shall immediately inform the PCG Engineer and await his instruction before proceeding with clearance.

In the event that trees or other vegetation not designated for clearance are damaged or destroyed, they shall be repaired or replaced to the satisfaction of the PCG Engineer.

d) Noise Level and Vibration Control

In general, all construction activities will be limited during daytime hours only (7:00 AM – 5:00 PM). Should there be a need to extend construction hours, proper coordination by the Project Contractor with the LGU and affected communities should be undertaken.

Regular check up and maintenance of heavy equipment will be conducted to control the generation of noise during project construction.

The Contractor shall control noise level from his construction operations to satisfy the Noise Standards of the "Rules and Regulations of the National Pollution Control Commission" (1978) for general areas as shown:

Noise standards in general areas are shown in the table:

MAXIMUM VALUES OF AIR POLLUTANTS

Category of Area[1]	Daytime[2]	Morning[3] and Evening[4]	Night Time[5]
AA	50dB	45dB	40dB
A	55	50	45
B	65	60	55
C	70	65	60
D	75	70	65

Legend:

AA - A section or contiguous area which requires quietness, such as an area within 100 meters from school sites, hospitals, and special homes for the aged.
B - A section or contiguous area which is primarily used for residential purposes.
C - A section primarily reserved as a light industrial area.
D - A section which is primarily reserved as a heavy industrial area

Daytime$_2$ - 9:00 A.M. to 6:00 P.M.
Morning$_3$ - 5:00 A.M. to 9:00 P.M.
Evening$_4$ - 6:00 A.M. to 10:00 P.M.
Night Time - 10:00 P.M. to 5:00 A.M.

Noise control measures shall include:

(1) Selecting construction equipment used or the modes of operation adopted that produce less noise. For instance, rotating or impacting machines can be based on anti-vibration mountings. Noisy construction equipment or internal combustion engines must be fitted with silencers.

(2) Measures such as installation of road/noise barriers must be undertaken to minimize excessive generation of noise and vibrations brought about by earthwork activities and heavy equipment during construction especially along portions of the route close to noise-sensitive areas, such as hospitals, schools and churches.

(3) Proper scheduling so that noisy construction activities will be done at daytime.

(4) Providing earmuffs to construction workers exposed to noise.

(5) Monitoring noise levels during construction.

(6) Management of traffic during construction to produce a smooth flow instead of a noisier stop-and-start flow.

(7) The source can be enclosed to insulate or absorb the sound.

e) Disposal of all Rubbish, Demolition Waste

The Contractor shall be entirely responsible for and ensure the safe and hygienic collection, transportation and disposal of all rubbish, tires, liquid/solid waste material off-site arising from construction activities and from site offices, and canteen, and for disposal of demolition waste that cannot be recycled. Fires and burning of rubbish and waste on the Site will not be permitted, nor the burying of rubbish and waste. Particular care shall be taken in identification and safe disposal of hazardous materials (if any).

f) Use of Wood and Fuel

The Contractor shall not use, or permit to be used, wood as fuel for the execution of any part of the Works and to the extent practicable shall ensure that fuels other than wood are used for cooking, space and water heating in all camps and living accommodations. Any wood so used must be harvested legally, and the Contractor shall provide the PCG Engineer with copies of the relevant permits if required.

g) Fire Prevention

In addition to the provision of adequate fire-fighting equipment at this base camp and other facilities to the satisfaction of the PCG Engineer, the Contractor shall take all precautions necessary to ensure that no vegetation along the line of the area of the permanent works is affected by fires arising from the execution of the Works. These precautions shall include the prevention of fires for any purposes in the vicinity of the Works except where expressly permitted by the PCG Engineer.

In the event of any other fire emergency in the vicinity of the Works, the Contractor shall render assistance to the civil authorities to the best of his ability.

h) Relationships with Local Communities and Authorities

In siting and operating his facilities and in executing the Works, the Contractor shall, at all times, and to the extent possible, minimize the impact of his activities on existing communities. Where communities are likely to be affected by major activities such as the establishment of a camp or extensive road closure or bypassing, he shall liaise closely with the concerned communities and their representatives and, if so directed, shall attend additional meetings arranged by the PCG Engineer to resolve issues and claims and minimize impacts on local communities.

Any problems arising from his operations and which cannot be resolved by the Contractor shall be referred to the PCG Engineer. The Contractor shall be responsible for any compensation due to reinstatements necessary with respect to any damage caused by him to areas outside the Site and no separate payment will be made in this regard.

i) Privately or Community-Owned Services and Structures

The Contractor shall take all necessary precautions to ensure that no public or private services, utilities or similar facilities are damaged or interrupted by the Works. These precautions shall include but not be limited to liaison with public and private service providers, local government units, and private owners; a condition survey of all affected services; provision of a satisfactory alternative service while the works are carried out; and reinstatement of a satisfactory permanent facility after completion of the Works in

each area.

No service or utilities shall be disturbed or cut before arrangements have been made for a satisfactory alternative service, or the Contractor has obtained agreement in writing from the service provider or owner to a temporary cessation of service.

Not less than 14 days before commencing site clearance on any particular section of the Project in accordance with his agreed Program of Work, the Contractor shall supply to the PCG Engineer for his prior approval, a copy of his condition survey of all utilities and services to be affected, copies of any agreements with service providers and owners, his plans for providing temporary service, and his plans for reinstating permanent service following construction of the Works.

Provision of temporary and permanent services shall be to at least the pre-existing level of service and to the satisfaction of the PCG Engineer.

j) Water Supply for Construction

The Contractor shall make the necessary arrangements, at his own expense, for water supply for construction and other purposes. Only clean water, free from deleterious materials and appropriate quality for its intended use, shall be used. In providing water, the Contractor shall ensure that the rights of and supply to existing users are not affected either in quality or timing.
In the event of a dispute over the effect of the Contractor's arrangement on the water supply of others, the PCG Engineer shall be informed immediately and shall instruct the Contractor as to appropriate remedial actions to be undertaken at his expense.

k) Construction and Management of Work Camp

The location of the work camp shall be far from residential areas. The Contractor shall provide adequate fuel or LPG gas for both cooking and other needs. The collection and treatment of solid wastes shall be maintained during construction. The Contractor shall prohibit illegal fishing and hunting in the vicinity of the camp. Cutting of trees shall be avoided to the extent possible and removal of vegetation shall be minimized. Water and pit latrine facilities shall be provided for the employees. At completion of the project, all wreckage, rubbish or temporary works that are no longer required shall be removed or given to local residents. All temporary structures including office building, shelters and latrines shall be removed to prevent encroachment within the road right-of-way. The site shall be restored to near natural or stable conditions. The PCG Engineer shall report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of the works.

1.4 TESTS ON COMPLETION

a. General

(1) Where the Works or parts thereof are required to perform or function in a particular manner, then before the Contractor requests that they be taken over by the Employer they shall have been tested, commissioned and passed all performance verification checks to ensure that they perform or function in the particular manner specified. Such tests shall include the operation of a system under the conditions expected to prevail during its normal operations. Where testing is required which exceeds normal operating conditions, or where particular testing is required, then this will be described in the appropriate parts of the Specifications.

(2) The sequence for testing which shall be complete prior to and as a prerequisite to the PCG Engineer issuing the Taking Over Certificate shall be :

- Testing : proof of operation in (generally) static conditions
- Commissioning : setting to work and adjusting as necessary in dynamic conditions
- Performance Verification : measurement of controlled outputs against design outputs
- Demonstration testing : equipment or system operation in differing modes

(3) Testing shall be undertaken using temporary power supplies and the like reticulated by the Contractor. Commissioning, Performance verification and Demonstration Testing shall be undertaken using mains utilities, upgraded and expanded as required by the Contract.

b. Testing

(1) Testing shall mean the proof of operation (generally) in static conditions of all Plant, mechanical equipment, materials and installed systems to the design requirements specified for tests and or the manufacturers test ratings. Where tests or specific test requirements are not shown in the Specification for particular elements of the Works the tests to be undertaken shall be those shown in the standards, codes of practice and the like, applicable to those elements of the Works.

(2) The Contractor shall submit to the PCG Engineer for his approval a complete programme for testing all Plant, mechanical and electrical equipment, materials and installed systems. Separate attachments to this programme shall be provided in a standard format identifying as a minimum requirement :

- Plant, mechanical and electrical equipment, materials or installed systems to be tested
- standard(s) applicable to the test to be undertaken
- design test requirement
- methods, equipment and personnel to be used for the test
- appropriate notices issued to local and or airport authorities
- proposed test date and time.

Space shall be available on the form to record the test date, the results of the test and any comments, consumables used for the test, the PCG Engineer's staff witnessing the test and the PCG Engineers approval. Two copies of the completed and signed test record shall be issued to the PCG Engineer within 5 days of completing the test. The original shall be retained by the Contractor for incorporation to the Operation and Maintenance Manuals.

a. Commissioning

(1) Commissioning shall mean the setting to work calibrating, balancing, adjusting and measuring outputs of all plant, mechanical and electrical equipment and installed systems against the designed performance outputs. Commissioning shall be carried out for all Mechanical and Electrical equipment/system in accordance with the internationally recognized standards or codes as approved by the PCG Engineer. All automatic controls, refrigeration, conveying, hoisting, and other specialist systems shall be commissioned by, or with, the relevant manufacturer in attendance.

(2) The Contractor shall submit to the PCG Engineer for his approval a complete programme for commissioning all Plant, mechanical and electrical equipment and installed systems. Separate attachments to this programme shall be provided in a standard format to the requirement of 1.8.b.(2) above, suitably amended for commissioning purposes.

b. Performance Verification

(3) Performance Verification shall mean the measurement of speeds, flows, volumes, noise, outputs and the like to verify the performance of all Plant, mechanical and electrical equipment and installed systems against the specified performance during the specified range of conditions and over specified durations in each operating mode. Performance verification shall be undertaken following the guidelines given in 1.8.a.(1) or as determined by the PCG Engineer.

(4) The Contractor shall submit to the PCG Engineer for his approval a complete programme for performance verification of all Plant, mechanical and electrical equipment and installed systems. Separate attachments to this programme shall be provided in a standard format to the requirements of 1.8.b.(2) above, suitably amended for performance verification purposes.

c. Demonstration Testing

Demonstration testing shall be undertaken as performance verification with additionally the Employers staff in attendance as part of the Contractors training obligation. All Plant, mechanical and electrical equipment and installed systems shall be operated over limited durations to demonstrate, fault finding techniques, emergency stop, start up procedures and normal operating modes in varying conditions. A record of all tests, procedures and the like demonstrated together with a record of the Employers staff in attendance shall be submitted to the PCG Engineer.

d. Water Retaining and Conveying Structures

(1) Structures such as tanks, channels and pipelines intended for the storage or conveyance of water or aqueous liquids shall be tested for water tightness and pressure, as may be necessary, once they have been completed. Such tests shall be required to demonstrate that the individual structures do not leak and that the system formed by the interlinking or connection of the structures also does not leak. Water testing, except where otherwise stated in the Specifications, shall consist of:

- filling the structures to be tested with water;
- leaving the water-filled structures to stand for 24 hours;
- topping the water level up to a set mark;
- leaving the water-filled structures to stand for a further 24 hours;
- undertaking pressure test on water pipelines as required by the Specifications; and

- measuring the reduction in level and calculating the loss of water.

(2) The structures shall be considered to be watertight if the loss of water is less than 2% of the total volume of water required to fill the structures to the set mark.

1.5 PUBLICITY

The Contractor shall not, by means of advertising, writings to and for publications, photographs, notices, boards or any other means, use the Works for publicity except with the expressed permission of the PCG Engineer in writing.

1.6 INSURANCES

a. General

In order to permit preliminary works to commence, the Contractor shall, upon receipt of the PCG Engineer's Notice to Proceed, immediately arrange suitable insurances and shall submit to the PCG Engineer cover notes showing that the appropriate insurances are in force. The Contractor shall submit, at the same time as the cover notes, statement(s) from the insurer(s) to the effect that the cover notes are, and the policies to be issued will be in accordance with the Contract and that all the requirements of the Contract are covered.

b. Approval

As the policies of insurance are issued the Contractor shall submit them to the PCG Engineer for scrutiny prior to approval by the Employer.

c. Responsibility for Maintaining Insurance Cover

The Contractor shall be wholly and solely responsible for keeping all policies in force and for paying all premiums and other charges necessary for effecting the insurance cover to the full extent required under the Contract.

1.7 OWNERSHIP OF SOFTWARE PROGRAMMES

The Contractor is to ensure that the ownership of all programmes for operation of any equipment is vested in the Employer.

1.8 INCOME TAX AND OTHER TAXES

The Contractor and his employees shall be liable for income tax and such other taxes, duties, contributions and other charges levied on all payments made to them as shall be payable in accordance with any National or Local Statute, Ordinance, Decree or other Law of the Republic of the Philippines. The Contractor shall ascertain for himself all such liabilities and shall make due allowance in his rates which will be deemed to cover all such costs.

1.9 INTERFERENCE WITH WORKS

The Contractor shall not interfere in any way with any existing works, whether the property of the Employer or of a third party and whether the position of such works is indicated to the Contractor by the PCG Engineer or not, except where such interference is specifically described as part of the Works, either in the Contract or in the PCG Engineer's instructions.

1.10 RATES AND PRICES

In addition to the detailed breakdown of unit prices submitted by the Contractor prior to award of Contract, the Contractor shall also provide legitimate invoices or quotations, of any rate or price contained in the Contract Documents when required by the PCG Engineer to do so. Said documents will be for the purpose of this contract and shall not be made public.

1.11 PERMITS AND LICENSES

The Contractor shall ensure all permits and licenses, and pay all charges, taxes and fees and shall give all notices necessary and incident to the due and lawful execution of the Works.

The Contractor shall also pay all tonnage and other royalties, rent and other payments or compensation, if any for getting stone, sand, gravel or other materials required for the Temporary Works or any of them.

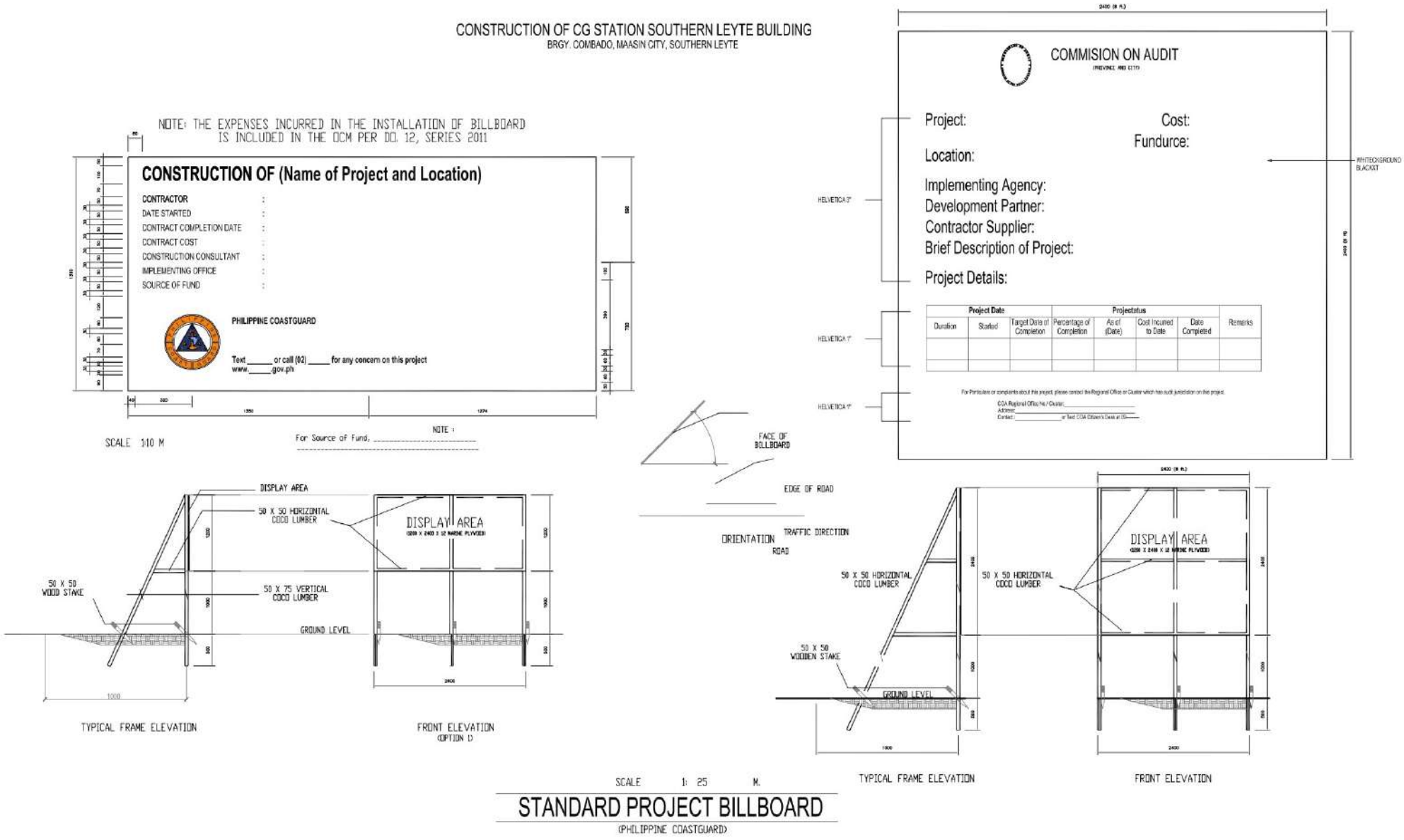
The Contractor shall make application and be entirely responsible for obtaining the Occupancy Permit, and pay at his own expense for all processing fees and the like.

The requirements under this Section are incidental to other items of work and will not be paid separately unless otherwise specified in the Bill of Quantities.

1.12 OTHER REQUIREMENTS

The procuring entity reserves the right to conduct background investigation and security clearance to all prospective bidders. Proponents / bidders who are found to have connection, relation, or affiliation to any prescribed, designated terrorist organizations and personalities, those countries whose policies that are contrary, adverse and inconsistent with existing law of the Government of the Philippines, either during eligibility check, post-qualification, or during the implementation stage, whether locally, by the United Nation or other supranational or foreign jurisdiction shall automatically be disqualified/terminated. Further, any bidder or proponent and its personnel who is found to endanger or breach security shall constitute a ground for cancellation of contract.

Annex A
of Part B – Other Requirements


CONSTRUCTION OF CG STATION SOUTHERN LEYTE BUILDING
BRGY. COMBADO, MAASIN CITY, SOUTHERN LEYTE
NOTE: THE EXPENSES INCURRED IN THE INSTALLATION OF BILLBOARD IS INCLUDED IN THE OCM PER DO. 12, SERIES 2011
CONSTRUCTION OF (Name of Project and Location)
CONTRACTOR :
DATE STARTED :
CONTRACT COMPLETION DATE :
CONTRACT COST :
CONSTRUCTION CONSULTANT :
IMPLEMENTING OFFICE :
SOURCE OF FUND :
PHILIPPINE COASTGUARD
Text _____ or call (02) _____ for any concern on this project
www._____.gov.ph
SCALE 1:10 M
NOTE :
For Source of Fund, _____
COMMISION ON AUDIT
Project: Cost:
Fundurce:
Location:
Implementing Agency:
Development Partner:
Contractor Supplier:
Brief Description of Project:
Project Details:
Project Date
Projectatus
Duration
Started
Target Date of Completion
Percentage of Completion
As of (Date)
Cost Incurred to Date
Date Completed
Remarks
HELVETICA 8"
HELVETICA 7"
HELVETICA 6"
WHITE/CK/GROUND BLACK/T
FACE OF BILLBOARD
EDGE OF ROAD
ORIENTATION
TRAFFIC DIRECTION
ROAD
DISPLAY AREA
50 X 50 HORIZONTAL COCO LUMBER
50 X 50 WOOD STAKE
50 X 75 VERTICAL COCO LUMBER
GROUND LEVEL
TYPICAL FRAME ELEVATION
FRONT ELEVATION
(OPTION 1)
50 X 50 WOODEN STAKE
SCALE 1: 25 M.
STANDARD PROJECT BILLBOARD
(PHILIPPINE COASTGUARD)

II. CIVIL WORKS (SITE DEVELOPMENT WORKS)

DIVISION 1 – EARTHWORKS

ITEM 103 - STRUCTURE EXCAVATION

103.1 DESCRIPTION

This Item shall consist of the necessary excavation for culverts and other structures not otherwise provided for in the Specifications. Except as otherwise provided for pipe culvert, the backfilling of completed structures and the disposal of all excavated materials, shall be in accordance with these Specifications and reasonably close conformity with the Plans or as established by the PCG Engineer.

It shall also include the furnishing and placing of approved foundation fill material to replace unsuitable material encountered below the foundation elevation of structures.

No allowance will be made for classification of different types material encountered.

103.2 CONSTRUCTION REQUIREMENTS

103.2.1 Clearing and Grubbing

Prior to starting excavation operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with Item 100, Clearing and Grubbing.

103.2.2 Excavation

(1) General, all structures. The Contractor shall notify the PCG Engineer sufficiently in advance of the beginning of any excavation so that cross-sectional elevations and measurements may be taken on the undisturbed ground. The natural ground adjacent to the structure shall not be disturbed without permission of the PCG Engineer.

(2) Trenches or foundation pits for structures shall be excavated to the lines and grades or elevations shown on the Plans or as staked by the PCG Engineer. They shall be of sufficient size to permit placing of structures of the full width and length shown.

Boulders, logs, and other objectionable materials encountered excavation shall be removed.

After each excavation is completed, the Contractor shall notify the PCG Engineer to that effect and no bedding material shall be placed until the PCG Engineer has approved the depth of excavation and the character of the foundation material.

(3) Structures other than pipe culverts. All rock or other hard foundation materials shall be cleaned all loose materials, and cut to a firm surface, either level, stepped, or serrated as directed by the PCG Engineer. All seams or crevices shall be cleaned and grouted. All loose and disintegrated rocks and thin strata shall be removed. When the foundation material is soft or mucky or otherwise unsuitable, as determined by the PCG Engineer, the Contractor shall remove the unsuitable material and backfill with approved granular material. This foundation fill shall be placed and compacted in 150 mm (6 inches) layers up to the foundation elevation.

(4) **Pipe Culverts.** The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe.

Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 300 mm or 4 mm for each 100 mm of fill over the top of pipe, whichever is greater, but not to exceed three-quarters of the vertical inside diameter of the pipe. The width of the excavation shall be at least 300 mm (12 inches) greater than the horizontal outside diameter of the pipe. The excavation below grade shall be backfilled with selected fine compressible material,

such as silty clay or loam, and lightly compacted in layers not over 150 mm (6 inches) in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, such unstable soil under the pipe and for a width of at least one diameter on each side of the pipe shall be removed to the depth directed by the PCG Engineer and replaced with approved granular foundation fill material properly compacted to provide adequate support for the pipe, unless other special construction methods are called for on the Plans.

The foundation surface shall provide a firm foundation of uniform density throughout the length of the culvert and, if directed by the PCG Engineer, shall be cambered in the direction parallel to the pipe centerline.

Where pipe culverts are to be placed in trenches excavated in embankments, the excavation of each trench shall be performed after the embankment has been constructed to a plane parallel to the proposed profile grade and to such height above the bottom of the pipe as shown on the Plans or directed by the PCG Engineer.

103.2.3 Utilization of Excavated Materials

All excavated materials, so far as suitable, shall be utilized as backfill or embankment. The surplus materials shall be disposed off in such manner as not to obstruct the stream or otherwise impair the efficiency or appearance of the structure. No excavated materials shall be deposited at any time so as to endanger the partly finished structure.

103.2.4 Backfill and Embankment for Structures Other Than Pipe Culverts

Excavated areas around structures shall be backfilled with free draining granular material approved by the PCG Engineer and placed in horizontal layers not over 150 mm (6 inches) in thickness, to the level of the original ground surface. Each layer shall be moistened or dried as required and thoroughly compacted with mechanical tampers.

In placing backfills or embankment, the material shall be placed simultaneously in so far as possible to approximately the same elevation on both sides of the structure. If conditions require placing backfill or embankment appreciably higher on one side than on the opposite side, the additional material on the higher side shall not be placed until the masonry has been in place for 14 days, or until tests made by the laboratory under the supervision of the PCG Engineer establishes that the masonry has attained sufficient strength to withstand any pressure created by the methods used and materials placed without damage or strain beyond a safe factor.

Backfill or embankment shall not be placed behind the walls of concrete culverts or rigid frame structures until the top slab is placed and cured.

All embankments adjacent to structures shall be constructed in horizontal layers and compacted as prescribed in Subsection 104.3.3 except that mechanical tampers may be used for the required compaction. Special care shall be taken to prevent any wedging action against the structure and slopes bounding or within the areas to be filled shall be benched or serrated to prevent wedge action. The placing of embankment and the benching of slopes shall continue in such a manner that at all times there will be horizontal berm of thoroughly compacted material for a distance at least equal to the height of the abutment or wall to the backfilled against except insofar as undisturbed material obtrudes upon the area.

Broken rock or coarse sand and gravel shall be provided for a drainage filter at weep holes as shown on the Plans.

103.2.5 Bedding, Backfill, and Embankment for Pipe Culverts

Bedding, Backfill, and Embankment for pipe culverts shall be done in accordance with Item 500, Pipe Culverts and Storm Drains.

103.3 METHOD OF MEASUREMENT

103.3.1 Structure Excavation

The volume of excavation to be paid for will be the number of cubic metres measured in original position of material acceptably excavated in conformity with the Plans or as directed by the PCG Engineer, but in no case except as noted, will any of the following volumes be included in the measurement for payment:

1. The volume outside of vertical planes of 450 mm (15 inches) outside of and parallel to the neat line of the structures

2. The volume of excavation for culvert and sections outside the vertical plane for culverts stipulated in (1) above.

3. The volume of any excavation performed prior to the taking elevations and measurements of the undisturbed ground.

4. The volume of any material rehandled, except that where the plans indicate or the PCG Engineer directs the excavation after embankment has been placed and except that when installation of pipe culverts by the imperfect trench method specified in Item 500 is required, the volume of material re-excavated as directed will be included.

The volume of structural backfill to be paid for will be the number of cubic meters of granular materials actually provided and placed within the limit of excavation.

103.3.2 Foundation Fill

The volume of foundation fill to be paid for will be the number cubic meters measures in final position of the special granular material or lean concrete actually provided and placed below the foundation elevation of structures as specified, complete in place and accepted.

103.3.3 BASIS OF PAYMENT

The accepted quantities measure as prescribed in Section 103 shall be paid for at the contract unit price for each of the particular pay item listed below that is included in the Bill of Quantities. The payment shall constitute full compensation for the removal and disposal of excavated materials including all labor, equipment, tools and incidentals to complete the work prescribed in this Item.

Payment will be made in accordance with the Bill of Quantities.

PART C – PERIMETER FENCE AND GATE

PERIMETER FENCE AND GATE

PART 1- GENERAL

1.1 SCOPE

Furnish material and equipment and perform labor required to establish lines, grades and reference marks for the accurate layout of the building and other construction. See drawings for location and extent of work required.

1.2 VERIFICATION OF EXISTING CONDITIONS

Verify and examine the site to familiarize with the existing conditions affecting the work.

PART 2 – PRODUCTS

2.1 BUILDING LAYOUT MATERIALS

a. Form Lumber; good lumber
b. Ga. 16 G.I tie Wire
c. CW nail

PART 3 - EXECUTION

3.1 STAKES AND BATTERBOARDS

a. Stake out building accurately and establish grades.

b. Batter boards and reference marks shall be erected at locations where they will not be disturbed during the construction.

c. Construct two permanent benchmarks of previously known elevations near the site of construction.

3.2 METHOD OF MEASUREMENT

Building layout shall be measured by square meters performed and accepted.

3.3 BASIS OF PAYMENT

The accepted quantity measured as prescribed in Method of Measurement shall be paid for at the contract unit price for building layout which price and payment shall be full compensation for furnishing and placing all materials, including labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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DIVISION 3 – CONCRETE

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 Applicable Publications

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless specified, all publications below shall be of the latest edition.

1.1.1 American Concrete Institute (ACI) Publications:

ACI 224 R	Control of Cracking in Concrete Structures
ACI 301	Specifications for Structural Concrete for Buildings
ACI 302.1 R	Guide for Concrete Floor and Slab Construction
ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
ACI-305R	Hot-Weather Concreting
ACI 315	Details and Detailing of Concrete Reinforcement
ACI 318R	Building Code Requirements for Reinforced Concrete
ACI 347-R	Recommended Practice for Concrete Formwork
ACI 350R	Environmental PCG Engineering Concrete Structures

1.1.2 American Society for Testing and Materials (ASTM) Publications:

C 39	Compressive Strength of Cylindrical Concrete Specimens
C 94	Ready-Mixed Concrete
C920	Elastomeric Joint Sealants
C 138	Test Methods for Unit Weight, Yield and Air Content (Gravimetric) or Concrete
C 231	Standard Test Method for Air Content of Freshly-Mixed Concrete by the Pressure Method
C 173	Standard Test Method for Air Content of Freshly-Mixed Concrete by the Volumetric Method
D 1751	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
1.1.3	American Welding Society (AWS) Publication:
D1.4	Structural Welding Code-Reinforcing Steel

1.1.4 Product Standards Agency (PSA) Publications:

a. Philippine National Standards:

PNS 07 Specifications for Portland Cement

PNS 18 Specifications for Concrete Aggregates

PNS 49 Specifications for Steel Bars for Concrete Reinforcement

b. Standards Administrative Order (SAO)

SAO-6 Philippine Plywood

1.2 Description of Work

The work includes the provision of cast-in-place concrete. In the ACI publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" has been substituted for "should" wherever it appears.

1.3 Submittals:

1.3.1 Shop Drawings

Reproductions of contract drawings are unacceptable.

a. Shop Drawings for Reinforcing Steel: ACI 315. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover.

Do not scale dimensions from structural drawings to determine lengths of reinforcing rods.

b. Shop Drawings for Formwork: ACI 347. Include design calculations indicating arrangement of forms, sizes and grade of supports (lumber), panels, and related components. Indicate placement schedule, construction, and location and method of forming control joints. Include locations of inserts, pipework, conduit, sleeves, and other embedded items. Furnish drawings and descriptions of shoring and reshoring methods, proposed for suspended slab, spandrel beams, and other horizontal concrete members. Furnish schedule of form removal of structures not included in paragraph 3.5.5 “Removal of Forms”.

c. Shop Drawings for Construction Joints: ACI 318. Drawings shall clearly indicate sequence of pouring for all footings, columns, beams and slabs.

1.3.2 Contractor Mix Design: Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Furnish a complete list of materials including type; brand; source and amount of cement and admixtures; applicable reference specifications; and copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Submit additional data regarding concrete aggregates if the source of aggregate changes.

1.3.3 Certified Laboratory Test Reports: Before delivery of materials, certified copies in 5 copies of the reports of all tests required in referenced publications or otherwise specified herein shall be submitted to and approved by the Owner’s Representative. The testing shall have been performed within one year of submittal of the test reports for approval by an independent laboratory approved by the Owner's Representative. Test reports on a previously tested

materials shall be accompanied by notarized certificates from the manufacturer certifying that the previously tested material is of the same type, quality, manufacture, and make as that proposed for use in this project. Certified test reports are required for the following:

a. Aggregates
b. Reinforcement
c. Cement

1.3.4 Certificates of Compliance:

a. Materials for Curing Concrete
b. Joint filler
c. Vapor barrier
d. Admixtures

1.3.5 Catalog Data:

a. Materials for curing concrete
b. Joint filler
c. Vapor barrier
d. Admixtures

1.4 DELIVERY AND STORAGE:

1.4.1 Cement

Cement in bags shall be stored in a suitable weatherproof structure which shall be as air-tight as practicable; floors shall be elevated above the ground a distance sufficient to prevent the absorption of moisture. Bags shall be stacked close together to reduce circulation of air but shall not be stacked against outside walls; the manner of storage shallpermit easy access for inspection and identification of each shipment. Bulk cement shall betransferred to elevated airtight and weatherproof bins. At the time of use all cement shall befree-flowing and free of lumps. Cement that has been in storage longer than 6 months will be tested by standard mortar tests or other tests as deemed necessary by the Owner's Representative to determine its suitability for use and such cement shall not be used withoutapproval of the Owner's Representative.

1.4.2 Aggregates

Aggregates shall be stored on areas covered with tightly laid wood planks, sheet metal, or other hard and clean surface, and in a manner that will preclude the inclusion of foreign material. Aggregates of different sizes shall be stored in separate piles. Stock piles of coarse aggregate shall be built in horizontal layers not exceeding 1.20 meters in depth to minimize segregation. Should the coarse aggregate become aggregated it shall be remixedto conform to the grading requirements.

1.4.3 Reinforcement

Store reinforcement of different sizes in racks raised above the ground with accurate identification. Protect reinforcing steel from contaminants such as grease, oil, and dirt.

1.4.4 Admixtures

Admixtures shall be stored in a manner that will not damage the containers.

PART 2 - PRODUCTS

2.1 CONCRETE

2.1.1 Contractor-Furnished Mix Design

ACI 211.1 and ACI 301. Unless indicated otherwise on the drawings, the following shall apply:

Location	28 Day Compressive Strength		Maximum Aggregate Size (mm)	Slump (max)
	MPa	psi		
Suspended Slabs, Beams and Girders	28	4,000	20	100mm
Columns and Pedestal	28	4,000	20	100mm
Footings and Footing Tie Beams	28	4,000	20	100mm
Slab on Grade	21	3,000	20	100mm
Retaining Walls	28	4,000	20	100mm
Stairs and Parapet (if any)	28	4,000	20	100mm
Other not indicated	28	4,000	20	100mm

2.2 MATERIALS

2.2.1 Cement

Cement shall conform to ASTM C150, Type I Portland Cement

2.2.2 Water

Water shall be fresh, clean, and potable.

2.2.3 Aggregates

Aggregate shall conform to ASTM C33, except as modified herein. Obtain aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement.

2.2.4 Non-shrink Grout

Non-shrink grout shall be non-metallic conforming to ASTM C 827.

2.2.5 Admixtures

a. Accelerating: ASTM C 494, Type C.

b. Retarding: ASTM C 494, Type B or D.

c. Water Reducing: ASTM C 494, Type A or E.

d. Air entraining, ASTM C 260

Percentage of air content shall be as required in ACI 318, ACI 201.2R and ASTM C 1116, as applicable.

e. Materials for Forms

Provide wood, plywood, or steel. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Plywood shall conform with SAO 6, Type I, Grade A or better surfaces. Steel form surfaces shall not contain irregularities, dents, or sags.

2.2.7 Reinforcement

a. Reinforcing Bars

Reinforcing bars shall conform to ASTM A 615 (Weldable). All reinforcing steel shall be deformed. Reinforcing steel shall have a minimum yield strength of 275 MPa (Grade 40) for bars dia. 12mm and smaller, and 414 MPa (Grade 60) for bars dia. 16 and larger.

2.2.8 Vapor Barrier

Vapor barrier shall be made of polyethylene sheet, minimum 6 mil thickness conforming to ASTM C 171.

2.2.9 Materials for Curing Concrete

a. Impervious Sheeting: ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

b. Pervious Sheeting: AASHTO M 182.

c. Liquid Membrane-Forming Compound: ASTM C 309, white-pigmented, Type 2, Class B, free of paraffin or petroleum.

d. Liquid Chemical Sealer-Hardener Compound: Compound shall not contain petroleum resins or waxes. Compound shall not reduce the adhesion of resilient flooring, tile, paint, waterproofing, or other material applied to concrete.

e. Expansion/Contraction Joint Filler: ASTM D 1751 or ASTM D1752.

f. Joint Sealants

g. Horizontal Surfaces (3 percent slope, maximum):

(1) Outside Buildings: ASTM D 1190.

(2) Inside Buildings: ASTM D 1190 or ASTM D 1850.

(3) Vertical Surfaces (greater than 3 percent slope): ASTM C 920, Type M, Grade NS, Class 25, Use T.

(4) Forms: ACI 301

(5) General Requirements

Forms shall be provided for all concrete not indicated or specified otherwise. Forms shall be set true to line and grade and maintained so as to insure

completed work within the allowable tolerance specified, and shall be mortar-tight. The Contractor shall be responsible for the adequacy of forms and form supports. Bolts and rods used for internal ties shall be arranged so that when the forms are removed, all metals will have concrete cover not less than that indicated in the drawings. Bolts or rod type form ties that must be removed when forms are removed shall not be used for watertightforms. Wire tire shall not be used where the concrete surface will be exposed to weathering and where discoloration will be exposed. All form work shall be provided with adequate clean-out openings to permit inspection and easy cleaning after all reinforcement has been placed. Where forms for continuous surfaces are placed in successive units, the forms shall be fitted over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Panel forms shall be constructed to provide tight joints between panels. All forms shallbe constructed so that they can be removed without damaging the concrete.All exposed joints, edges, and external corners shall be chamfered a minimum of 20 mm unless specified otherwise herein. Forms for heavy girders and similar members shall be constructed with a proper camber asindicated.

f. Materials for Forms

Forms shall be of wood, plywood, or steel. Wood forms for surfaces exposed to view in the finished structure and requiring a smooth form finish, shall be plywood. For unexposed surfaces, undressed square-edge lumber may be used. Forms for surfaces requiring special finishes shall be plywood, or shall be lined with plywood, a non-absorptive, hard-pressed fiberboard, absorptive-type lining or other suitable material. Plywood, other than for lining, shall be concrete-form plywood not less than 16 mm thick free of raised grain, torn surfaces, worn edges, patches, or other surface defects which would impair the texture of the concrete surface. Surfaces of steel forms shall be free from irregularities, dents, and sags.

g. Coating

Before placing the concrete, the contact surfaces of forms shall be coated with a non-staining mineral oil or suitable non-staining form coating compound or shall be given two coats of nitrocellulose lacquer, except as specified otherwise. Mineral oil shall not be used on forms for surfaces which are to be painted. For surfaces not exposed to view in the finished structure, sheathing may be wetted thoroughly with clean water. All excess coating shall be removed by wiping with cloths. Reused forms shall have the contact surfaces cleaned thoroughly; those which have been coated shall be given an additional application of the coating. Plaster waste molds shall be sized with two coats of thin shellac or lacquer and coated with soft or thinned non-staining grease.

h. Tolerance and Variations

The Contractor shall set and maintain concrete forms to ensure that, after removal of the forms and prior to patching and finishing, no portion of the concrete work will exceed any of the tolerances specified. Variations in floor levels shall be measured before removal of supporting shores. The Contractor shall be responsible for variations due to deflection, when the latter results from concrete quality or curing other than that which has been specified. The tolerances specified shall not be exceeded by any portion of any concrete surfaces; the specified variation for one element of the

structure will not be applicable when it will permit another element of the structure to exceed its allowable variations except as otherwise specified herein, tolerances shall conform to ACI 347.

PART 3 - EXECUTION

3.1 PROPORTIONING, MEASUREMENT AND MIXING

ASTM, C94, ACI 301, ACI 302.1R, and ACI 304, except as modified herein.

3.1.1 Proportioning of Materials

Proportioning of materials shall be accomplished by weighing, except as otherwise provided herein. In urgent situations, volumetric proportioning may be used temporarily, if permitted by the Owner's Representative, who will stipulate the length of the period during which volumetric proportioning may be used. The Contractor shall furnish the necessary equipment and shall establish accurate procedures for determining the quantities of free moisture in the aggregates, the true volume of the fine aggregate if volumetric proportioning is used, and the air content of the freshly mixed concrete if air-entrained concrete is used. Moisture, volumetric, and air determinations shall be made at intervals as directed by the Owner's Representative as specified herein under Sampling and testing requirements. Allowable tolerances for measuring cement and water shall be one percent; for aggregates 2 percent and for admixtures 3 percent.

a. Weight Measurement

The fine aggregate and each size of coarse aggregate shall be weighed separately. Cement in standard packages shall be weighed on a scale separate from that used for weighing the other materials.

b. Volumetric Measurement

The weight proportions shall be transposed into equivalent volumetric proportions by weighing representative samples of the aggregates in the condition in which they will be measured and in accordance with ASTM C 29. In determining the true volume of the fine aggregate, allowance shall be made for the bulking effect from the moisture contained therein. Suitable allowances shall also be made for variations in the moisture conditions of the aggregates.

3.1.2 Mixing

All concrete shall be machine mixed. In emergencies, the mixing may be done by hand if so authorized by the Owner's Representative. Mixing shall begin within 30 minutes after the cement has been added to the aggregates. The time of mixing after all cement and aggregates are in the mixer drum shall be not less than one minute for mixers having a capacity of one cubic yard or less; for mixers of larger capacities, the minimum time shall be increased 15 seconds for each additional cubic yard or fraction thereof of additional capacity. A reduction in the aforementioned mixing time shall be permitted in accordance with ASTM C 94 if mixer performance tests made at the Contractor's option and at his expense, indicate adequate mixing with the reduced time. All mixing water shall be introduced in the drum before one-fourth of the mixing time has elapsed. The entire contents of the mixer drum shall be discharged before recharging. The time elapsing between the introduction of the mixing water to the cement and aggregates or the cement to the aggregates and placing of the concrete in final position in the forms shall not exceed 60 minutes if the air temperature is less than 30 degrees C and 45 minutes if the air temperature is equal or greater than 30 degrees C. The retempering of concrete, i.e., remixing with or without additional cement, aggregate, or water, is not permitted.

3.1.3 Ready Mixed Concrete

Ready-mixed concrete shall conform to ASTM C 94 as modified herein. Ready-mixed concrete is defined in this specification as concrete produced regularly by a commercial establishment and delivered to the purchaser in the plastic state. Ready-mixed concrete may be used provided that (a) the plant has sufficient capacity and transportation equipment to deliver the concrete at the rate desired, and (b) the plant meets the requirements specified herein for equipment, measurement of materials, and mixing, except as modified herein. The cement, aggregates, water and admixtures shall conform to all applicable requirements of this specification. Ready-mixed concrete not specified otherwise herein shall be mixed and delivered by one of the following methods.

a. Truck Mixing

Concrete shall be mixed and delivered in a truck mixer. Mixers shall be charged with a ribbon fed mixture of aggregates and cement, or in the absence of facilities forribbon feeding, the aggregates shall be charged before the cement. When mixing isbegun during or immediately after charging a portion of the mixing water not in excess of that required to produce the minimum acceptable slump, shall be added ahead of or with, the other ingredients. Total mixing shall be for not less than 50 normore than 100 revolutions of the drum at the manufacturer's rated mixing speed after all ingredients including water are in the drum except as follows: After 30 to 75 revolutions of the drum the slump shall be tested and additional water shall be added if necessary to produce the required slump; if additional water is necessary, mixing shall be continued for at least 20 revolutions after the water is added. Mixing speed shall be not less than 16 rpm for open-top mixers, and not less than 4 rpm nor more than 16 rpm for open-top mixers. Any turning of the drum during transportation shall be at the speed designated by the manufacturer of the equipment, as agitating speed. Each batch of concrete delivered at the job site shallbe accompanied by a time slip issued at the batching plant, bearing the time of departure therefrom and the signature of the inspector. Discharge of concrete from the drum shall be completed within one hour or before the drum completes 250 revolutions after the introduction of water to the cement and the aggregates.

b. Combination Central Plant and Truck Mixing (Shrink Mixing)

Concrete shall be partially mixed in a central plant mixer and the mixing completed in a truck mixer. The mixing time in a central-plant mixer shall be the minimum required to intermingle the ingredients and shall not exceed 30 minutes. The mixing shall be completed in a truck mixer as specified herein under truck mixing.

c. Central-Plant Mixing

Concrete shall be mixed completely in a stationary mixer at a plant and transported to the site of the work in a truck agitator or a truck mixer operating at a speed of rotation designated by the manufacturer as agitating speed. Mixing shall begin within 30 minutes after cement has been added to aggregates. When authorized in writing by the Owner's Representative, non-agitation equipment approved by him may be used for transporting concrete. The time lapse between the introduction of the mixing water to the cement and aggregates and the placing of concrete in final position in theforms, shall not exceed: (a) for agitating equipment - 60 minutes, air temperature less than 30 degrees C; (b) for non-agitating equipment - 30 minutes.

d. Consistency of Concrete

Slump shall be determined in accordance with ASTM C 143. Samples for slump determination shall be taken from the concrete during placing in the forms.

3.2 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS: ACI 301

3.2.1 General Requirements

All reinforcement bars, stirrups, hanger bars, wire fabric, spirals and other reinforcing materials shall be provided as indicated in the drawing or required by this specification, together with all necessary wire ties, chairs, spacers, supports and other devices necessary to install and secure the reinforcement properly. All reinforcement, when placed, shall be free from rust, scale, oil, grease, clay, and other coatings, and foreign substances that would reduce or destroy the bond. Rusting of reinforcement shall not reduce the effective cross sectional area of the reinforcement to the extent that the strength is reduced beyond specified values. Heavy, thick rust or loose, flaky rust shall be removed by rubbing with burlap or other approved method, prior to placing. Reinforcement which has bends not shown on the project drawings or on approved shop drawings, or is reduced in section by rusting such that its weight is not within permissible ASTM tolerances, shall not be used. All reinforcement shall be supported and wired together to prevent displacement by construction loads or by the placing of concrete. Unless directed otherwise by the PCG Engineer, reinforcement shall not be bent after being partially embedded in hardened concrete. Detailing of reinforcing shall conform to ACI 315. Where cover over reinforcing steel is not specified or indicated it shall be in accordance with ACI 318.

3.2.2 Placing

Reinforcement shall be placed accurately and secured. It shall be supported by suitable chairs and spacers or by metal hangers. On the ground, and where otherwise subject to corrosion, concrete or other suitable non-corrodible material shall be used for supporting reinforcement. Where the concrete surface will be exposed to the weather in the finished structure or where rust would impair the appearance or finish of the structure, all reinforcement supports, within specified concrete cover, shall be galvanized or made of a suitable non-corrodible material.

3.2.3 Splicing of Reinforcement

Splicing of reinforcement shall be in accordance with ACI 318, except as indicated otherwise or modified herein. Where splices in addition to those indicated on the drawings are necessary, they shall be approved by the Owner's Representative prior to their use. Splices shall not be made in beams, girders, and slabs at points of maximum stress. Butt splicing shall preferably be used over lapping for bar sizes larger than 32 mmϕ. Splices to be welded shall conform to AWS D 1.4; certification of weld ability of the reinforcement by the manufacturer, shall be submitted to the Owner's Representative. If the Contractor elects to use butt splicing of reinforcing, he shall submit complete details of the process to be used to the Owner's Representative. If butt splices are used the Contractor shall ensure that the splice meets the requirements specified herein by performing at least three splices which shall be submitted for tests to a testing laboratory that has been approved for such testing by the Owner's Representative. The cost of these shall be borne by the Contractor.

3.2.4 Moving Reinforcing Steel

All placement or movement of reinforcing steel after placement, to positions other than indicated or specified, shall be subject to the approval of the Owner's Representative.

3.2.5 Concrete Protection for Reinforcement

Concrete protection for reinforcement shall be as indicated; or if not indicated, in accordance with ACI 318.

3.2.6 Tolerances and Variations

The minimum concrete cover for reinforcement specified in the contract documents takes precedence over all permissible reinforcement-placement variations; nothing in the variations listed below is to be construed as permitting violation or compromise thereof:

a.	Height of bottom bars	plus or minus 6 mm. above form
b.	Lengthwise positioning	plus or minus 50 mm. of bars
c.	Spacing bars in walls	plus or minus 25 mm. and solid slabs
d.	Spacing bars in	minus 0 mm plus 6 mm. beams and footings
e.	Height of top bars	minus 0 mm plus 6 mm.
f.	Stirrup spacing	
	(1) For any one stirrup	plus or minus 25 mm.
	(2) For over-all group	plus or minus 25 mm. of stirrups

3.2.7 Vapor Barrier: Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 300 mm. Remove torn, punctured, or damaged vapor barrier material and provide with new vapor barrier prior to placing concrete. Concrete placement shall not damage vapor barrier material.

3.2.8 Setting Miscellaneous Material: Anchors and bolts, including but not limited to those for machine and equipment bases; frames or edgings, hangers and inserts, door bucks, pipe supports, pipe sleeves, pipes passing through walls, metal ties, conduits, flashing reglets, drains and all other materials in connection with concrete construction shall, where practicable be placed and secured in position when the concrete is placed. Anchor bolts for machines shall be set to templates, shall be plumbed carefully and checked for location and elevation with an instrument, and shall be held in position rigidly to prevent displacement while concrete is being placed.

3.3 CONVEYING AND PLACING CONCRETE

ACI 301 and ACI 304, except as modified herein.

3.3.1 Conveying: Concrete shall be conveyed from the mixer to the forms as rapidly as practicable by proper methods which will not cause segregation or loss of ingredients. It shall be deposited as nearly as practicable in its final position in the forms. At any point in the conveying, the free vertical drop of the concrete shall not exceed 1 m. Conveying equipment shall be cleaned thoroughly before each run. All concrete shall be deposited as soon as practicable after the forms and the reinforcement have been inspected and approved by the Owner's Representative. Concrete which has segregated in conveying shall be removed anddisposed of as directed by the Owner’s Representative.

3.3.2 Placing Concrete: No concrete shall be placed after there is evidence of initial set. Concrete placement will not be permitted when weather conditions prevent proper placement and consolidation. The placement of concrete in uncovered areas during periods of precipitation will not be allowed except for covered areas. Subgrades of earth or other material shall be properly prepared and, if necessary, covered with heavy building paper or other suitable

material to prevent the concrete from becoming contaminated. Before placing concrete on porous subgrades, they shall be dampened. Forms shall be clean of dirt, construction debris and water. Fresh concrete shall not be placed on vertical supporting members such as columns and walls without approval of the Owner's Representative. Concrete shall be deposited in approximately horizontal layers, 300 mm to 500 mm deep in a manner to preclude the formation of cold joints between successive layers.

3.3.3 Vibration: All concrete shall be compacted with high frequency, internal mechanical vibrating equipment supplemented by hand spading and tamping. Concrete slabs 100 mm or less in depth shall be consolidated by wood tampers, spading and settling with a heavy leveling straight edge. Vibrators shall be designed to operate with vibratory element submerged in the concrete, and shall have a frequency of not less than 6,000 impulses per minute when submerged. The vibrating equipment shall be adequate at all times in number of units and power of each unit to consolidate the concrete properly. Vibration of forms and reinforcement shall not be employed except when authorized specifically by the Owner’s Representative. Vibrators shall not be used to transport the concrete in the forms. Vibration shall be discontinued when the concrete has been compacted thoroughly and ceases to decrease in volume.

3.3.4 Construction Joints: Joints not shown on the drawings shall be made and located so as to least impair the strength of the structure and shall be subject to approval of the Owner’s Representative. In general, they shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joints inthe girders shall be offset a distance equal to twice the width of the beam. Horizontal joints inwalls and columns shall be at the underside of floors, slabs, beams, or girders and at the top offootings or grade slabs. Beams, girders, brackets, column capitals, haunches and drop panelsshall be placed at the same time as slabs. Joints shall be perpendicular to the mainreinforcement.

a. Reinforcement in Construction Joints

All reinforcing steel shall be continued across joints. Keys and inclined dowels shall be provided as indicated. Longitudinal keys at least 38 mm deep shall be provided in all joints in walls.

b. Preparation of Surface

The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed.

c. Bonding

When a bonded construction joint is required, bond shall be obtained by one of the following methods:

(i) The use of suitable chemical retardant which delays but does not prevent setting of the surface mortar. Retarded mortar shall be removed within 24 hours after placing to produce a clean exposed aggregate bonding surface.

(2) By roughening the surface of the concrete in proper manner, which will expose the aggregate uniformly and will not leave laitance, loosenedparticles of aggregate, or damaged concrete at the surface.

3.3.5 Embedded Items

a. Other Embedded Items

All sleeves, inserts, anchors and embedded items required for adjoining work or for its support shall be placed prior to concreting. All sub-contractors, whose work is related to the concrete or must be supported by it, shall be given ample notice and opportunity to introduce or furnish embedded items before the concrete is placed. All ferrous metal sleeves, inserts, anchors and other embedded ferrous items exposed to the weather or where rust would impair the appearance or finish of the structure shall be galvanized.

b. Placing Embedded Items: Expansion joint material, and embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids. Aluminum shall not be embedded in concrete except where aluminum is protected from direct contact with the concrete.

c. Reinforcing Bars: Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items, but not so as to impair design strengths of the members. If bars are moved more than one bar diameter, the resulting arrangement of bars shall be subject to the approval of the Owner's Representative.

3.3.6 Placing Concrete in Hot Weather

Placing concrete in hot weather shall be in accordance with ACI 305 except as modified herein. In hot weather, extra care should be made to prevent rapid drying of newly placed concrete. When the outdoor ambient temperature is more than 32 degrees C; the temperature of the concrete as placed shall not exceed 32 degrees C; the fresh concrete shall be shaded as soon as possible after placing; and curing shall be started as soon as the surface of the fresh concrete is sufficiently hard to permit it without damage.

3.4 SURFACE FINISHES (EXCEPT FLOOR AND SLAB ON GRADE)

3.4.1 Repair of Surface Defects

All surface defects including tie holes, minor honeycombing, and other defective concrete shall be repaired with cement mortar with the approval of the Owner's Representative. Cement mortar for patching shall be the same composition as that used in the concrete, except that for exposed surfaces part of the cement shall be white portland cement to provide a finish color matching the surrounding concrete. Patching shall be done as soon as the forms are removed; areas of surfaces, which are to be cured with a curing compound, shall be covered during the application of the compound. All areas to be patched shall be cleaned thoroughly. Minor honeycombed or otherwise defective areas shall be cut out to solid concrete to a depth of not less than 25 mm. The edges of the cut shall beperpendicular to the surface of the concrete. The area to be patched and at least 150 mm adjacent thereto shall be saturated with water before placing the mortar. The mortar shall be mixed approximately one hour before placing and shall be remixed occasionally during thisperiod with a trowel without the addition of water. A grout of cement and water mixed to the consistency of paint shall then be brushed onto the surfaces to which the mortar is to be bonded. The mortar shall be compacted into place and screened slightly higher than the surrounding surface. Patches shall be cured as specified for the concrete. Holes extending through the concrete shall be filled by means of a plunger type gun or other suitable device from the unexposed face. The excess mortar shall be wiped off the exposed face with a cloth. Finished surfaces shall be protected from stains and abrasions as cast finish against

steel, plywood, forms, and rubbed finish shall be equal in workmanship, texture, and general appearance to that of sample panels specified herein. Concrete with excessive honeycombing, which exposes the reinforcing steel or other defects which affect the structural strength of the member, shall be rejected or the defects corrected as directed by the Owner's Representative, and at the expense of the Contractor.

3.4.2 Finishing of Formed Surfaces

Finishing of formed surfaces shall be accomplished as soon as practicable after form removal and repair of surface defects. Finishing shall be accomplished and specified herein where indicated.

a. As Cast Finishes

b. Smooth Form Finish: The form facing material shall produce a smooth, hard, uniform texture on the concrete. Tie holes and defects shall be patched. All fins shall be completely removed.

c. Rough Form Finish: No selected form facing materials are required for rough form finish surfaces. Tie holes and defects shall be patched. Fins exceeding 6 mm in height shall be chipped off or rubbed off. Otherwise, surfaces shall be left with the texture imparted by the forms.

3.4.3 Unindicated Finish

Finishes not indicated on the drawings shall be as follows.

a. Smooth Form Finish

For all concrete surfaces exposed to public view.

b. Rough Form Finish

For all concrete surfaces not exposed to public view.

3.4.4 Unformed Surfaces

a Related Unformed Surfaces

Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of the adjacent formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

3.5 CURING AND PROTECTION (Except Floors)

ACI 301 unless otherwise specified.

3.5.1 General Requirements

Concrete shall be protected adequately from injurious action by sun, rain, flowing water, and mechanical injury, and shall not be allowed to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Curing shall be accomplished by moist curing, or by application of liquid chemical or liquid membrane forming compound, except as specified otherwise herein. Membrane forming compound shall not be used on surfaces for which special finish is specified, on any surface to be painted, waterproofed,

tiled, roofed, or where coverings are to be bonded. Completion of curing shall be initiated immediately following the removal of forms.

3.5.2 Moist Curing

a. Mats

The entire surface of the concrete shall be covered with two thicknesses of wet burlap weighing not less than 250 gram per square meter, dry weight, mats, or other suitable material having high absorptive quality. The material shall be thoroughly wet when applied and shall be kept continuously wet during the time it remains on the slab. Mats shall be made of clean material which is free from any substance which will have a deleterious effect on the concrete; they shall be at least as long as the width of the concrete under construction. During application, the mats shall not be dragged over the finished concrete nor over mats already placed; shall they be placed to provide complete coverage of surface and edges of the pavement with a slight overlap over adjacent mats. These mats shall be left in place not less than 7 days during which time they shall be kept wet continuously.

b. Impervious-Sheeting Curing: The entire exposed surface shall be wetted thoroughly with a fine spray of water and then covered with (a) waterproofed paper, (b) polyethylene-bonded water-proof paper sheeting, (c) polyethylene-coated burlap sheeting, or (d) polyethylene sheeting, as specified elsewhere herein. Sheets shall be laid directly on the concrete surface and overlapped 300 mm when a continuous sheet is not used. The curing medium shall be not less than 450 mm wider than the concrete surface to be cured, and shall be weighed down by placing a bank of moist earth on the edges just outside the forms and over the transverse laps to form closed joints. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.5.3 Liquid Membrane-Forming Compound Curing

Liquid membrane-forming compound curing shall be accomplished by applying a white-pigmented liquid compound, free of paraffin or petroleum, over the concrete surface torestrict evaporation of the mixing water. All joint openings except sawed joints shall be sealed at the top by inserting moistened paper or fiber rope, or covering with strips of waterproof material, prior to application of the curing compound, in a manner to prevent thecuring compound from entering the joint. Seven days following the placing of the liquid membrane forming compound shall be considered as the end of the curing period and the basis for determining when joint sealing material will be placed in joints.

a. Application of Curing Compound

The compound shall be applied immediately after the surface losses its water sheen and has a dull appearance and before joints are sawed. Curing compound shall be agitated thoroughly by mechanical means during use and shall be applied uniformly in a 2-coat continuous operation by suitable power-spraying equipment. The total coverage for the two coats shall be between 4 to 5 square meter per liter of undiluted compound. The compound shall form a uniform, continuous, coherent filmthat will not check, crack or peel and shall be free from pinholes or other imperfections. An additional coat of the compound shall be applied immediately toareas where the film is defective. Suitable covering other than liquid curing compound, shall be kept readily available for use to protect the freshly placed concrete in the event conditions occur which prevent correct application of the compound at the proper time. Concrete surfaces that are subject to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed with

two coats of curing compound by the method and at the foregoing coverage rate specified, at no additional cost to the Owner.

b. Protection of Treated Surfaces

Concrete surfaces to which liquid membrane-forming compounds have been applied shall be kept free from all foot and vehicular traffic and all other sources of abrasion for not less than 72 hours. Continuity of the coating shall be maintained for the entire curing period and any damage to the coating during this period shall be repaired immediately.

c. Liquid Chemical Sealer-Hardener Curing

Apply sealer-hardener to interior floors not receiving floor covering and floors located under access flooring. Apply the sealer-hardener in accordance with manufacturer's recommendations. Seal or cover joints and opening in which joint sealant is to be applied as required by the joint sealant manufacturer. The sealer-hardener shall not be applied until the concrete has cured for a minimum of 30 days. Apply a minimum of 2 coats of sealer-hardener.

3.5.4 Curing Periods

When the 7-day compression-test-cylinders, representative of parts of a structure already placed, indicate that the 28-day strengths may be less than 90 percent of the design strengths, those parts of the structure shall be given additional curing, as directed by the Owner. Cast-in-place parts of a structure which will be permanently submerged in fresh water may be cured for not less than 12 hours, provided they are submerged immediately thereafter. Curing, except steam curing, shall be as follows:

Time (minimum)	Concrete Element
7 days	All concrete not specified otherwise

3.5.5 Removal of Forms and Protection: Forms shall be removed in a manner, which will prevent damage to the concrete. Forms shall not be removed without approval of the PCG Engineer, or before the expiration of the minimum periods specified herein:

	Days After Placing
Side forms on beams, girders and columns	1
Forms for columns	7

	Days After Placing
Supporting forms for slabs, beams, girders	14

Sufficient shoring members to support dead load plus construction loads on beams, girders and slabs shall be provided for a period of 7 days in addition to the 14 days specified herein.

3.5.6 Special Requirements for High-Early-Strength Portland Cement Concrete: The curing periods, minimum periods during which supporting forms and shores shall be left in place, and minimum periods for maintaining curing temperatures shall be not less than one-quarter

of those specified herein for Portland cement concrete, but in no case less than 48 hours.

3.6 SAMPLING AND TESTING:

3.6.1 Sampling

a. Aggregates

Prior to production and delivery of aggregates, at least one initial sample shall be taken at the source. Each sample shall be collected by taking three incremental samples at random from the source material to make a composite sample of not less than 20 kilograms. Three random samples shall then be taken from each 270 metric tons of material, or a day's run, whichever is the least amount, during the course of the project. Three increments shall be taken from the same vehicle at the central plant during unloading. The above sampling shall be repeated when the source of material is changed or when unacceptable deficiencies or variations from the specified grading of materials are found in testing.

b. Coarse Aggregates: A 20 kilograms or larger sample for analysis as specified herein shall be taken 2 times daily with a sampling device approved by the Owner's Representative. The samples shall be taken from the conveyor belt. The plant shall be brought up to full operation before samples are taken. The samples shallbe taken so that a uniform cross-section, accurately representing the materials onthe belt or in the bins, is obtained. Random checks of the sampling may be madeby the Owner's Representative. Additional sampling is required when analyses show deficiencies or unacceptable variances or deviation from the specified requirements.

c. Fine Aggregates: A 20 kilogram-sample shall be taken as specified herein for sampling of fine aggregate. The sample shall be taken at least 2 times daily for sieve analysis of fine aggregate sand and specific gravity tests. Additional samplesmay be required when analyses show deficiencies, unacceptable variances, or deviations. Sampling can be reduced to 1 time daily when test results show that the fine aggregates consistency meet specified requirements. Samples of sand shall be taken when the sand is moist.

d. Sample Identification: Each sample shall be contained in a clean container which shall be securely fastened to prevent loss of material. It shall be tagged for identification. The tag shall contain the following information:

Contract No. _____

Sample No._____Quantity _____

Date of Sample _____

Sampler _____

Source _____

Intended Use _____

For Testing _____

e. Concrete: ASTM C 172. Samples for strength tests of concrete placed each day shall be taken not less than once a day, nor less than once for each 50 cubic meters of concrete, nor less than once for each 400 sq.m. of surface area for slabs or walls.

Nine (9) cylinders shall be molded from each day sample.

3.6.2 Testing

a. Aggregate Testing: Gradation tests shall be made on each sample without delay. All other aggregate tests required by this specification shall be made on the initial source samples, and shall be repeated whenever there is a change of source. The tests shall include an analysis of each grade of material and an analysis of the combined material representing the aggregate part of the mix.

b. Cement:

c. The Contractor's inspection shall be performed in accordance with PNS 07. The Contractor's certification shall include:

(1) A report of the mill test results signed by the laboratory chemist;

(2) At the time of shipment from the mill or other storage point, a manufacturer's certificate that the cement was tested in accordance with the specified requirements.

(3) A statement that the concrete for the project will contain cement conforming to the specified requirements.

The Contractor shall make all necessary arrangement with the cement supplier and carrier for the identification and transportation of the certified cement from the manufacturer to the concrete batch plant.

d. At any time the cement stored at the concrete plant or other storage area is not certified by the cement manufacturer for use in the project, or if the Contractor desires to use cement of a different brand or type which is not certified by the cement mill, the Contractor shall, before using the cement, secure three random samples of the cement in storage, and arrange for complete chemical and physicaltests by an Owner approved cement testing laboratory to provide information as to the properties of the cement. Test results of each individual sample shall be reported; acceptance will be determined on the average test result of the three samples for the selected lot size. Cement not meeting the specified requirements shall not be used in the concrete. Each shipment of acceptable cement as determined by field tests shall be sampled, the samples identified and stored for notless than 42 days. A random sample shall be tested for conformance at least onceeach month. The sampling and testing shall continue until subsequent shipments of cement are certified by the cement producer.

e. The Owner reserves the right to inspect and sample at the source or at the site of work all cement to be used on the project.

f. Concrete Testing:

. Testing consistency of concrete slumps shall be determined in accordance with ASTM C 143. Consistency may be determined in the field by means of the ball-penetration method in accordance with ASTM C 360 after a correlation betweenslump and ball-penetration is determined. Tests to verify the ratio will be made at least once each working day. Samples for slump determination will be taken from the concrete during placing in the forms; samples for ball-penetration shall be takenas specified in ASTM C 360. Tests shall be made as follows:

1. At the beginning of a concrete placement operation and at subsequent

intervals to insure that the specification requirements are met.

2. Whenever test cylinders are made.

Compressive Tests: Testing of specimen for compressive strength shall be in accordance with ASTM C 39. Test two (2) cylinders at seven (7) days, six (6) cylinders at twenty eight (28) days and hold one (1) cylinder in reserve. When a satisfactory relationship between 7-day and 28-day strength has been established, the 7-day test results may be used as an indicator of the 28-day strength. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days. If the average of the three strength test result is less than f'c or if any strength test result falls below f'c by more than 3.5 MPa (500 psi), take a minimum of three ASTM C42 core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core tests shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strength shall be retested. Demolition and concrete replacement if recommended shall be borne by the Contractor.

Air Content Tests: Test methods for air content of concrete shall comply with ASTM C-138, C 173 and C 231 as applicable.

3.7 METHOD OF MEASUREMENT

The quantity of structural concrete, reinforcing steel or other Contract Pay Items shall constitute the completed and accepted structure which shall be measured for payment in the manner prescribed in the several items involved.

3.8 BASIS OF PAYMENT

The quantities measured as provided in the Method of Measurement shall be paid for at the contract price for the several pay items which price and payment shall be full compensation for furnishing, preparing, fabricating, placing, curing and for all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section. Such payment shall constitute full payment for the completed structure ready for use.

Payment will be made in accordance with the Bill of Quantities.

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DIVISION 4 – MASONRY

SECTION 04800 - REINFORCED MASONRY (CHB)

PART 1 - GENERAL

1.1 Applicable Publications

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless specified, all publications below shall be of the latest edition.

1.1.1 American Concrete Institute (ACI) Publication:

Manual of Standard Practice for Detailing Reinforced Concrete Structures

1.1.2 American Society for Testing and Materials (ASTM) Publications:

C 39	Compressive Strength of Cylindrical Concrete Specimens
C 91	Masonry Cement
C 144	Aggregate for Masonry Mortar
C 270	Mortar for Unit Masonry
C 404	Aggregates for Masonry Grout
C 426	Drying Shrinkage of Concrete Block
D 1056	Flexible Cellular Materials-Sponge or Expanded Rubber
D 1667	Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed Cell Sponge) E 447 Compressive Strength of Masonry Prisms

1.1.3 Product Standards Agency (PSA) Publications (Philippines):

PNS 07	Specifications for Portland Cement
PNS 16	Specifications for Concrete Hollow Blocks
PNS 18	Specifications for Concrete Aggregate
PNS 49	Specifications for Steel Bars for Concrete Reinforcement
SAO 181	Industrial Quicklime and Hydrated Lime

1.2 Definitions

1.2.1 Concealed Masonry Surfaces:

a. Surfaces of foundation walls against which backfill is placed.

b. Surfaces covered by furring and wallboard plaster, stucco, or masonry facings.

c. Surfaces above suspended ceilings.

d. Surfaces within attic spaces, crawl spaces, pipe or duct chases and elevator shafts.

1.2.2 Exposed Masonry Surfaces

Masonry surfaces other than those listed above including those to be painted.

1.2.3 Grout Lift and Grout Pour

A grout lift is the layer of grout placed in a single continuous operation. A grout pour is the entire height of grout fill placed in one day and is composed of a number of successively placed grout lifts.

1.2.4 Reinforced Hollow Unit Masonry

Hollow concrete masonry units reinforced vertically and horizontally with steel bars located within cells or kerfs in the units and with cells containing reinforcing bars filled solidly with grout.

1.2.5 Additional Definitions:

a. Back-Up: That part of masonry walls which is behind the exterior facing.

b. Bed Joint: The horizontal layer of mortar on which a masonry unit is laid.

c. Head Joint: The vertical mortar joint between ends of masonry units. Sometimes

d. Kerf: A cut or notch made with a saw, or with a cutter, part way through a portion of a unit.

e. Low Lift Grouting: The technique of grouting masonry in 0.20 to 1.8 meters lifts as the wall is being laid.

f. Reinforced Masonry: Masonry in which reinforcement is embedded in such a manner that the component act together to resist lateral forces.

1.3 Delivery, Storage and Handling

Handle, store and protect masonry units to avoid chipping, breakage or contact with the soil. Keep steel reinforcing bars free of rust and loose scale. Reject rusted steel reinforcing bars. Deliver cement and lime in unbroken bags, barrels, or other sealed containers. Keep cementitious materials dry. Store and handle cement to prevent the inclusion of foreign materials. Store aggregates in a manner to avoid contamination or segregation. Plainly mark and label containers with the manufacturer's names and brands.

PART 2- PRODUCTS

2.1 Masonry Units

2.1.1 Concrete Masonry Units (CHB):

a. Aggregates: ASTM C33

b. Linear Drying Shrinkage: Not to exceed 0.065 percent when tested in accordance with ASTM 426.

c. Kinds and Shapes: In addition to the requirements specified, concrete masonry units of the various kinds shall conform to PNS 16, Type II for 150 mm thick(f'm = 7 MPa / 5 MPa) and for 100 mm thick (f'm = 2.5 MPa). Include closer, jamb, lintel and bond beam units and special shapes and sizes to complete the work as indicated.

2.2 Centering Device

Provide centering clips that prevent displacement of reinforcing bars during the course of construction.

2.3 Deformed Reinforcing Bars

ASTM A615, Grade 275 (40,000 psi).

2.4 Materials for Mortar and Grout

2.4.1 Admixtures

a. Admixtures: May be used in mortar or grout provided that the admixture does not adversely affect bond or compressive strength of mortar or grout.

b. Prohibited Ingredients: Do not use air entraining compounds, calcium chloride salts or other chemicals that will adversely affect metals or the coatings of metals embedded in the mortar or grout.

2.4.2 Aggregate for Mortar

ASTM C 144, except that not less than 3 percent nor more than 15 percent shall pass the No. 100 sieve. Aggregate used in mortar for joint 6 mm or less shall have 100 percent passing the No. 8 sieve with 10 percent being retained on the No. 16 sieve.

2.4.3 Aggregate for Grout:

a. Fine Aggregate: ASTM C 404, Size No. 2 or ASTM C 144.

b. Pea Gravel: ASTM C 404, except that 100 percent shall pass the 9 mm screen and not more than 5 percent shall pass the No. 8 sieve.

c. Coarse Aggregate: ASTM C 404, size No. 8.

2.4.4 Portland Cement

ASTM C150, Type I.

2.4.5 Lime Putty

Slaked according to manufacturer's instructions.

a. Hydrated Lime: SAO 181.

b. Pulverized Quicklime: SAO 181 except 100 percent shall pass the No. 20 sieve and 90 percent shall pass the No. 50 sieve.

c. Lime Paste: Lime paste shall be made with pulverized quicklime or hydrated lime. Hydrated lime processed by the steam method shall be allowed to soak not less than 24 hours. Quicklime and other hydrated lime shall be allowed to soak not less than 72 hours. In lieu of hydrated lime paste for use in mortar, the hydrated lime may be added in the dry form.

2.4.6 Water: Potable.

2.5 Mortar Mixes

2.5.1 Proportions

Type M in accordance with the proportion specifications of ASTM C 270. The mortar shall have a flow, after 11 minutes, of 75 percent or more when tested for water retention in accordance with ASTM C 91 except mortar shall be mixed to an initial flow of 105 to 115 percent.

2.6 Grout Mixtures

2.6.1 Proportions

Mix in laboratory established proportions to in a compressive strength at 28 days of not less than 13.80 MPa (2,000 psi) when tested in accordance with ASTM C 91 for fine aggregate and ASTM C 39 for grout containing coarse aggregate. Grout shall be classified as fine and low lift types as specified below.

a. Fine Grout: Portland cement, fine aggregate, and sufficient water to obtain a pouring consistency without segregation of the constituents. Slump shall be approximately 125 mm.

b. Low Lift Grout: Portland cement, lime paste or hydrated lime, fine aggregate and coarse aggregate, and sufficient water to obtain a pouring consistency without segregation of the constituents. Slump between 200 and 250 mm.

2.7 Source Quality Control

Prior to delivery of masonry units to the site, select by random sampling nine individual whole units from the units proposed for use. Select units free from cracks or other structural defects. Test in accordance with PNS 16.

PART 3 - EXECUTION

3.1 Preparation

3.1.1 Protection

a. Forms and Shores: Where required, construct forms to the shapes, lines, and dimensions of the members indicated. Construct forms sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Do not remove supporting forms or shores until the supported masonry has acquired sufficient strength to support its weight and construction loads to which it may be subjected. In no case shall supporting forms or shores be removed in less than 10 days. Wait at least 16 hours after grouting masonry walls after applying uniform loads and wait an additional 48 hours before applying concentrated loads.

b. Wall Bracing: Brace walls against wind and other forces during construction. Allow sufficient time between lifts to prevent cracking of face shells of hollow masonry units. If blowouts, misalignment, or cracking of face-shells should occur during construction, tear down and rebuild the wall at no additional cost to the Owner.

3.1.2 Surface Preparation

Clean laitance, dust, dirt, oil, organic matter or foreign materials from concrete surface upon which reinforced masonry is to be placed. Use sandblasting, if necessary, to remove laitance

from pores and expose to the aggregate.

3.2 Laying Masonry Units

3.2.1 Wet Masonry Units

Do not wet concrete masonry units. Do not lay units having a film of water on the surface.

3.2.2 Embedded Items

Build in wall plugs, accessories, flashings pipe sleeves and other items required being built-in as the masonry works progresses. Fill cells receiving anchor bolts and cells of the first course below bearing plates with mortar or grout. Fill spaces around metal doorframes and other built-in items with mortar. Point openings around flush-mounted electrical outlet boxes in wet locations, including the flush joint above the box with mortar. Do not embed aluminum items.

3.2.3 Bond Beams and Lintels: Install bond units, reinforced as indicated, filled with grout. Install open bottom type bond beam units over cells to be filled. Place wire mesh or small mesh metal lath under open bond beam units if used over cells not to be filled.

3.2.4 Unfinished Work: Step back-unfinished work for joining with new work. Do not use toothing without the written approval of the Owner's Representative. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

3.2.5 Placing Units: Lay hollow masonry units so as to preserve the vertical continuity of cells filled with grout. The minimum clear horizontal dimensions of vertical cores shall be 50 mm by 75 mm. Masonry bond units at corners. Anchor intersections by reinforcing bars as indicated. Adjust each unit to its final position while mortar is still soft and plastic. If any unit is disturbed after mortar has stiffened, remove and relay in fresh mortar. Keep chases, raked out joints, and spaces to be grouted, free from mortar and other debris.

3.2.6 Bond Pattern: Lay masonry units in running bond.

3.2.7 Cutting and Fitting: Wherever possible, use full units of the proper size in lieu of cut units. Use power masonry saws for cutting and fitting. Concrete -masonry units shall be wet cut. Make cut edges clean, true and sharp. Make openings carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will be aligned at the bottom with the masonry joints. Cut webs of hollow masonry units to the minimum required for proper installation. Provide reinforced masonry lintels, above openings over 300 mm wide for pipes, ducts and cables trays unless steel sleeves are used.

3.2.8 Mortar Joints: Spread bed joints with mortar for the full thickness of the face shells. Where only cells containing reinforcement are to be grouted, spread cross webs around such cell with mortar to prevent leakage of grout. Butter head joints for full thickness of the face shell and place the units. Avoid fins of mortar that protrude into cells to be grouted.

3.2.9 Jointing: Tool joints when the mortar is thumbprint hard. Tool horizontal joints first. Brush joints to remove loose and excess mortar. Mortar joints shall be finished as follows:

a. Flush Joints: Flush cut joints in concealed masonry surfaces and joints above electrical outlet boxes in wet areas. Make flush cut joints by cutting off the mortar flush with the face of the wall.

b. Tooled Joints: Tool joints in exposed exterior and interior masonry surfaces slightly concave. Use a jointer of sufficient length to obtain a straight and true mortar joints.

c. Joint Width: 9 mm wide.

3.3 Placing Reinforcing Steel

Prior to placing grout, clean, reinforcement of loose, flaky rust, scale, grease, mortar, grout, or other coating which might destroy or reduce its bond with the grout. Details of reinforcement shall be in conformance with ACI 315. Do not bend or straighten reinforcing in a manner injurious to the steel. Do not use bars with kinks or bends not shown on the drawings. Placement of reinforcement shall be inspected and approved prior to placing grout.

3.3.1 Positioning Bars: Position vertical bars accurately at the centerline of the wall. Maintain a minimum clearance between the bars and masonry units of 12 mm and between parallel bars of one diameter of the reinforcement. Hold vertical reinforcing in place using metal support, centering clips, spacers, ties or caging devices located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement.

3.3.2 Splices: Locate splices only as indicated. Stagger splices in adjacent bars at least 600 mm. Lap bars a minimum of 40 diameters of the reinforcement or 600 mm, whichever is greater. Welded or mechanical connections shall develop the full strength of the reinforcement.

3.4 Placing Grout

Use a hand bucket, concrete hopper or grout pump. Place grout in final position within 1-½ hours after mixing. Where grouting is discontinued for more than one hour, stop the grout 25-mm below the top of a course to form a key at pour points. Place grout to completely fill the grout spaces without segregation of the aggregates.

3.4.1 Low Lift Grout Method

Place grout as masonry is erected at a rate that will not cause displacement of the masonry due to hydrostatic pressure of the grout. If mortar has been allowed to set prior to grouting, remove fins protruding more than 12 mm into the grout space. Rod or puddle grout during placement using a long 25-mm by 50-mm wood stick or a mechanical vibrator.

3.5 Tolerance

Lay masonry plumb, true to line, with course level. Keep bond patterns plumb throughout.

3.6 Field Quantity Control

3.6.1 Grout

Employ a qualified testing laboratory to proportion and test grout. Do not change laboratory established proportions or use materials with different physical or chemical characteristics in grout for the work unless additional evidence is furnished that the grout meets the specified requirements.

3.7 Cleaning

After mortar joints have attained their initial set but prior to hardening, completely remove mortar and grout daubs or splashing from exposed masonry surfaces. Before completion of the work, make out defects in joints in exposed masonry surfaces fill with mortar and tool to match existing joints. Immediately after grout work is completed remove scum and stains which have percolated through the masonry using a high pressure steam of water and a stiff fiber bristled brush. Do not use metal tools or metal brushes for cleaning. Dry brush exposed concrete masonry unit surfaces at the end of work each day.

3.8 Method Of Measurement

The quantity to be paid for shall be the number of square meters of reinforced concrete masonry completed in place and accepted. Projections extending beyond the faces of the walls shall not be included. In computing the quantity of payment, the dimensions used shall be those shown on the Plans. No deductions shall be made for weepholes, drainpipes or other openings of less than one square meter in area.

3.9 Basis Of Payment

The quantity of masonry, determined as provided in the Methods of Measurement, shall be paid for at the contract unit price per square meter of masonry, which price and payment shall be full compensation for furnishing and placing all materials, including mortar for masonry, for all necessary excavations, and for all labor, equipment, tools and incidentals to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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DIVISION 5 – METAL

SECTION 05120 -STRUCTURAL STEEL

PART 1 - GENERAL

1.1 Applicable Publications

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless specified, all publications below shall be of the latest edition.

1.1.1 American Institute of Steel Construction (AISC) Publications:

Manual of Steel Construction, 13TH Edition

Detailing for Steel Construction PCG

Engineering for Steel Construction

1.1.2 American National Standards Institute (ANSI) Publications:

B18.22.1 Plane Washers

1.1.3 American Society for Testing and Materials (ASTM) Publications:

A 36 Structural Steel

A 53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless

A 108 Steel Bars, Carbon, Cold-Finished, Standard Quality

A 307 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

A 325 High-Strength Bolts for Structural Steel Joints

A 370 Mechanical Testing of Steel Products

A 563 Carbon and Alloy Steel Nuts

C 827 Early Volume Change of Cementitious Mixtures

1.1.4 American Welding Society (AWS) Publications

D 1.1 Structural Welding Code, Steel

1.1.5 Steel Structures Painting Council (SSPC) Publications:

SSPC SP1 Surface Preparation Specification No. 1, Solvent Cleaning

SSPC SP3 Surface Preparation Specification No. 3, Power Tool Cleaning.

SSPC SP10-91 Surface Preparation Specification No. 10, Near White Blast

1.2 Description of Work

The work includes the fabrication, erection, and shop painting of structural steel in accordance with the AISC "Manual of Steel Construction" referred to herein. In the AISC "Manual of Steel Construction" referred to herein, the Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings," and the "Code of Standard Practice for Steel Buildings and Bridges", and “structural Joints using A325 or A490 Bolts” shall be considered a part thereto.

1.3 Submittals

1.3.1 Shop Drawings: Submit shop drawings of all structural steel in 5 copies for approval prior to fabrication of structural steel. Include complete information necessary for the fabrication and erection of the component parts of the structure including the location, type and size of all bolts and welds, members sizes and length, camber & connector details, blocks, copes, and cuts. Include all welds by standard welding symbols of the AWS.

1.3.2 Erection Plan: Submit descriptive data to illustrate the structural steel erection procedure including the sequence of erection and temporary shoring and bracing, and written description of the detailed sequence of all welding, including each welding procedure to be performed.

1.3.3 Certificates of Conformance: Submit certificates of conformance for the following:

a. Steel

b. Bolts, Nuts and Washers

c. Welding Electrodes and Rods

d. Shop Painting Materials

e. Nonshrink Grout

1.3.4 Certified Test Reports:

a. Structural Steel: Chemical analysis and tensile strength test required by ASTM A36.

b. High Strength Bolts and Nuts: Chemical analysis, tensile strength and hardness test required by ASTM A325.

c. Anchor Bolts: Chemical Analysis Tensile Strength and Hardness Test required by ASTM A 307.

1.4 Delivery and Storage

Handle, ship, and store material in a manner that will prevent distortion or other damage. Store material in a clean, properly drained location out of contact with the ground. Replace all damaged material with new material or repair damaged material in an approved manner at no additional cost to the owner.

PART 2 - PRODUCTS

2.1 Steel

2.1.1 Structural Steel: Shall conform to ASTM A 36.

2.1.2 Steel Pipe: Shall conform to ASTM A 53, Type E or S, Grade B, ASTM A 501.

2.2 Bolts, Nuts, and Washers

2.2.1 High Strength bolts for structural steel joints shall conform to ASTM A 325.

2.2.2 Anchor bolts shall conform to ASTM A 307.

2.2.3 Nuts: ASTM A 563, Grade A, heavy hex style, except nuts under 38 mm may be provided in hex style or equal.

2.2.3 Washers: ANSI B18.22.1, Type B or equal.

2.3 Accessories

2.3.1 Welding Electrodes and Rods: Steel structural members (built up columns, built up beams, beam to beam, beam to column, and base plate connections, trusses) shall use E70XX electrodes.

2.3.2 Non-shrink Grout: ASTM C 827; non-metallic.

PART 3 - EXECUTION

3.1 Fabrication: Fabricate in accordance with the applicable provisions of the Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings as set forth in Part 5 of the AISC "Manual of Steel Construction".

3.1.1 Welding of Structural Steelwork: Provide AWS D1.1 qualified welders, welding operators and tackers.

3.1.2 Shop Painting: Except as otherwise specified, shop paint surfaces of all structural steel, except steel to be embedded in concrete or mortar and bearing surfaces. Surfaces to be welded shall not be coated within 12 mm from the specified top of the weld prior to welding (except surfaces on which sheer studs are to be welded. Do not apply paint to steel which is at a temperature that will cause blistering or porosity or will otherwise be detrimental to the life of the paint. Apply paint in a workmanlike manner, and coat all joints and crevices thoroughly. Prior to assembly, paint all surfaces which will be concealed or inaccessible after assembly.

a. Cleaning: Wash clean surfaces which become contaminated with rust, dirt, oil, grease or other contaminants with solvents until thoroughly clean. Insure that steel to be embedded in concrete and surfaces when assembled, are free from rust, grease, dirt and other foreign matter.

b. Priming: Shop prime coat surfaces as soon as possible after cleaning. Apply two coats of epoxy red lead primer to a minimum dry film thickness of 2.0 mils.

3.1.3 Field Painting: When the erection work is complete, the heads of field bolts, all welds and any surface from which the shop coat of paint has become worn off or has otherwise become defective, shall be cleaned and thoroughly covered with two coats of shop coat paint. When the paint applied for touching up bolt heads and abraded surfaces has becomethoroughly dry, apply two field coats of finishing paint to a minimum dry film thickness of 2.0mils.

3.1.4 Marking: Prior to erection, members shall be provided with a painted erection mark. In addition, connecting parts assembled in the shop for remaining holes in field connections shall be matched marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations.

3.2 Erection

Except as modified herein, erect steel in accordance with the AISC "Manual of Steel Construction". Where parts cannot be assembled or fitted properly as a result of errors in fabrication or of deformation due to handling or transportation, report such condition immediately to the Owner's Representative and obtain approval therefrom for the methods of correction before proceeding with marking any corrections. Do not heat-treat parts for straightening. Drain steel work properly; fill pockets in structures exposed to the weather with an approved waterproof material. Provide safety belts and lines for workmen aloft on high structures unless safe working platforms or safety nets are provided. When calibrated wrenches are used for tightening bolts, calibrate them at least once each working day using not less than three typical bolts of each diameter. Do not use impact torque wrenches to tighten anchor bolts set in concrete.

3.2.1 Connections: Connections not detailed shall be designed in accordance with AISC “Manual of Steel Construction”. Build connections into existing work. Punch, subpunch and ream, or drill bolt holes.

3.2.2 Base Plates and Bearing Plates: After final positioning of steel members, provide full bearing under plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer’s instructions.

3.2.3 Tolerances: In accordance with the "Code of Standard Practice” of the AISC "Manual of Steel Construction".

3.2.4 Temporary Welds and Run-Off Plates and Backing Strips: Need not be removed.

3.3 Tests and Inspections

3.3.1 Visual Inspection of Welding: After the welding is completed, hand or power wire brush welds, and thoroughly clean them before the inspector makes the check inspection. Inspect welds with magnifiers under strong, adequate light for surface cracking, porosity, and slag inclusions; excessive roughness; unfilled craters; gas pockets; undercuts; overlaps; size and insufficient throat and concavity. Inspect the preparation of groove welds for adequate throat opening and for snug positioning of backup bars.

3.3.2. Nondestructive Testing: AWS D1.1. Twenty five percent of the total number of joints as selected by the Owner's Representative shall be tested. If more than 20 percent of welds contain defects identified by testing, then all welds shall be tested by radiographic or ultrasonic testing, as approved by the Owner's Representative. When all welds made are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

3.4 Method Of Measurement

The quantity of structural metal framing to be paid for shall be the number of kilograms complete in place and accepted.

3.5 Basis Of Payment

The quantities, measured as prescribed in the Method of Measurement, shall be paid for at the contract unit price for the several Pay Items which price and payments shall be full compensation for furnishing, preparing, fabricating, transporting, placing and erecting all structural steel and all other materials for the complete structure; for all shop work, painting and field work; for all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section. Such payment shall constitute full payment for the completed structure ready for use, and no allowance shall be made for cofferdam construction, false

work, or other erection expenses that shall be needed for the correction of misfits and errors in the fabrication.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 05510 - MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 SCOPE

Furnish materials and equipment and perform all work necessary to complete:

All miscellaneous metal work as shown and as hereinafter specified.

The work includes but is not necessarily limited to the following:

Stainless Steel Ladder Rung
Manhole Cover including frame and handleAnchors
Checkered plate manhole cover
and miscellaneous metals

See drawings for sizes, details and location of work required.

1.2 SUBMITTAL

a. Shop Drawings: Submit detailed shop drawings for approval prior to ordering materials or fabrication. Show complete information concerning fabrication installation, insert location, joint details, fastenings and other information requested by the PCG Engineer. Shop drawings shall be submitted in accordance with the requirements of the General Conditions.

Minor variation in details for the purpose of improving fabrication and installation procedures, but not affecting the exterior design concept or structural stability will be given consideration if submitted.

1.3 MEASUREMENT AND COORDINATIONS

Obtain measurements for all work required to be accurately fitted at the job and not from the drawings. The Contractor will be responsible for the accuracy of all such measurements and the precise fitting and assembly of the finish products. Coordinate the work with that of all other trades to prevent interference. Verify conditions at the job before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

a. Miscellaneous: Miscellaneous materials or accessories not listed above shall be provided as specified hereinafter the various items of work and/or indicated on the drawings, or in accordance with manufacturer's specifications.

PART 3 - EXECUTION

3.1 WORKMANSHIP

a. Make all works well formed to shape and size shown and assemble as detailed.

All items shall be of the materials, design, shape, sizes and thickness shown orcalled for on the drawings and herein specified. Methods of fabrication and assembly however, unless otherwise specifically stated, shall be of first quality craftsmanship and at the discretion of the Contractors whose responsibility shall be to guarantee satisfactory performance as herein specified.

b. Cut, shear and punch to produce clean, true lines and surfaces with burrs removed.

c. Weld or bolt connections as indicated. Use countersunk screws in recessed work where possible. Make all details of assembly strong with sufficient stiffness.Form joints exposed to weather in a manner to exclude water.

d. Provide all work proper clearances. Fabricate and install in a manner to providefor expansion and contraction but will insure rigidity and provide close fitting of sections.

e. Fabricate and install as directed by the Manufacturer.

f. Provide a protective clear coating which is resistant to alkaline, mortar and plaster to be applied to aluminum sections after fabrication.

3.2 PROTECTION

Protect all finished work until turnover to the Owner.

3.3 METHOD OF MEASUREMENT

The quantity to be paid for shall be the number of set of specified item actually completed and accepted.

3.4 BASIS OF PAYMENT

The quantities determined as provided in Method of Measurement shall be paid for at the contract price per unit of measurement, respectively, for each of the particular Pay Item listed on the Bill of Quantities, which price and payment shall constitute full compensation for furnishing and placing all materials, including all labor, equipment, tools and incidentalsnecessary to complete the work prescribed in this Item.

* * * * *

III. BUILDING WORKS (LIGHT STATION)

DIVISION 6 – SITE CONSTRUCTION

SECTION 02217 - BUILDING LAYOUT

PART 1- GENERAL

1.1 SCOPE

Furnish material and equipment and perform labor required to establish lines, grades and reference marks for the accurate layout of the building and other construction. See drawings for location and extent of work required.

1.2 VERIFICATION OF EXISTING CONDITIONS

Verify and examine the site to familiarize with the existing conditions affecting the work.

PART 2 – PRODUCTS

2.1 BUILDING LAYOUT MATERIALS

a. Form Lumber; good lumber
b. Ga. 16 G.I tie Wire
c. CW nail

PART 3 - EXECUTION

3.1 STAKES AND BATTERBOARDS

a. Stake out building accurately and establish grades.

b. Batter boards and reference marks shall be erected at locations where they will not be disturbed during the construction.

c. Construct two permanent benchmarks of previously known elevations near the site of construction.

3.2 METHOD OF MEASUREMENT

Building layout shall be measured by square meters performed and accepted.

3.3 BASIS OF PAYMENT

The accepted quantity measured as prescribed in Method of Measurement shall be paid for at the contract unit price for building layout which price and payment shall be full compensation for furnishing and placing all materials, including labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 02302 - EXCAVATION, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.1 American Society for Testing and Materials (ASTM)

ASTM D422 Particle-Size Analysis of Soils

ASTM D698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft (600 kN-m/m))

ASTM D1140 Amount of Material in Soils Finer Than the No. 200 (75-Micrometer) Sieve

ASTM D1556 Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D1557 Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft (2,700 kN-m/m))

ASTM D2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

ASTM D4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.1.2 U.S. Department of Agriculture (USDA)

DOA SSIR Soil Survey Investigation Report No. 1, Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples, Soil Conservation Service

1.2 DEFINITIONS

1.2.1 Backfill

Material used in refilling a cut, trench or other excavation.

1.2.2 Cohesive Materials

Soils classified by ASTM D2487 as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when fines have a plasticity index greater thanzero.

1.2.3 Cohesionless Materials

Soils classified by ASTM D2487 as GW, GP, SW, and SP. Materials classified, as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.

1.2.4 Compaction

The process of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of Compaction" is expressed as a percentage of the maximum density obtained by the test procedure described in ASTM D698 or ASTM D155 for general soil types.

1.2.5 Granular Pipe Bedding

A dense, well-graded aggregate mixture of sand, gravel, or crushed stone (mixed individually, in combination with each other, or with suitable binder soil) placed on a subgrade to provide a suitable foundation for pipe. Granular bedding material may also consist of poorly graded sands or gravels where fast draining soil characteristics are desired.

1.2.6 In-Situ Soil

Existing in place soil.

1.2.7 Lift

A layer or course of soil placed on top of subgrade or a previously prepared or placed soil in a fill or backfill.

1.2.8 Refill

Material placed in excavation to correct overcut in depth.

1.2.9 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling, drilling and the use of expansion jacks, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 0.76 cubic meter (1 cubic yard) in volume. Material identified in the soil boring logs as having a standard penetration resistance as determined by ASTM D1586 greater than 1968 blows per meter (600 blows per foot) is arbitrarily defined herein as "Rock."

a. Topsoil

In natural or undisturbed soil formations, the fine-grained, weathered material on the surface or directly below any loose or partially decomposed organic matter. Topsoil may be a dark-colored, fine, silty, or sandy material with a high content of well-decomposed organic matter, often containing traces of the parent rock material. Gradation and material requirements specified herein apply to all topsoil references in this contract. The material shall be representative of productive soils in the vicinity.

b. Unyielding Material

Rock rib, ridge, rock protrusion, or soil with cobbles in the trench bottom requiring a covering of finer grain material or special bedding to avoid bridging in the pipe or conduit.

c. Unsatisfactory Material

In-Situ soil or other material, which can be identified as having insufficient strength characteristics or stability to carry intended loads in the trench without excessive consolidation or loss of stability. Also backfill material, which contains refuse, large rocks, debris, soluble particles, and other material, which could damage the pipe or

cause the backfill not to compact. Materials classified as PT, OH, or OL by ASTM D2487 are unsatisfactory.

d. Unstable Material

Material in the trench bottom which lacks firmness to maintain alignment and prevent joints from separating in the pipe, conduit, or appurtenance structure during backfilling. This may be material otherwise identified as satisfactory which has been disturbed or saturated.

1.3 SUBMITTALS

a. Test Reports

b. Trench backfill material tests

c. Pipe bedding material tests

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver and store materials in a manner to prevent contamination, segregation, and other damage.

1.5 PROTECTION

1.5.1 Utilities

Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Excavation made with power-driven equipment is not permitted within 600 mm (two feet) of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand or light equipment. Start hand light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncoveredlines or other existing work affected by the contract excavation until the Engineer grants approval for backfill. Report damage to utility lines or subsurface construction immediately to the Engineer.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

Provide soil materials as specified below free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, or other deleterious and objectionable materials.

2.1.1 Backfill

Bring trenches to grade indicated on the drawings using material excavated on the site of this project. This material will be considered unclassified and no testing other than for compaction will be required before use as backfill, classified as GM, SM, SC by ASTM 2487with a maximum particle size of 75 mm (3 inches).

2.1.2 Special Backfill for Roads and Paved Areas

Backfill trenches under roads, structures, and paved areas as specified in Section 02300, "Earthwork for Structures and Pavements", with material conforming to the requirements stated above except that the liquid limit of the material cannot exceed 35 percent when tested in accordance with ASTM D4318, the plasticity index cannot exceed 12 percent

when tested in accordance with ASTM D4318, and not more than 35 percent by weight can be finer than the 75 micrometers No. 200 sieve when tested in accordance with ASTM D1140.

2.1.3 Sand

Clean, coarse-grained sand classified as SW or SP by ASTM D2487 for bedding and backfill as indicated.

2.1.4 Gravel

Clean, coarsely graded natural gravel, crushed stone or a combination thereof having a classification of GW GP in accordance with ASTM D2487 for bedding and backfill as indicated. Maximum particle size shall not be more than 25mm per 300mm (one inch per foot) of pipe diameter or 75mm (3 inches) maximum.

2.1.5 Topsoil Material

Salvaged topsoil from stockpile. Topsoil should be free of subsoil, stumps, rocks larger than 19 mm (3/4 inch) in diameter with maximum 3 percent retained on 6 mm (1/4 inch) sieve, brush, weeds, toxic substances, and other material or substance detrimental to plant growth. Topsoil shall be a natural, friable soil representative of productive soils in the vicinity. Modify the topsoil provided if necessary to meet the requirements specified in Table
2. Furnish additional topsoil from approved sources off the Site meeting requirements specified in Table 2 if stockpiled material is insufficient to complete work indicated.

TABLE 2

DOA SSIR Soil Survey Investigation Report No. 1, Laboratory Test for:	Acceptable Limits
Sand Content	20 - 45 percent by weight
Silt Content	25 - 50 percent by weight
Clay Content	10 - 30 percent by weight
Organic Material (Walkley-Block)	5 percent

TABLE 2

DOA SSIR Soil Survey Investigation Report No. 1, Laboratory Test for:	Acceptable Limits
pH	5.0 to 7.6
Soluble Salts	600-ppm maximum
Absorption Rate minimum	0.21 mm per second

2.1.6 Borrow

Provide materials meeting requirement for general site fill, backfill, granular fill, and topsoil. Obtain borrow materials in excess of those furnished from excavations specified herein from sources off the project area.

2.1.7 Pipe Bedding

Provide material for pipe bedding consisting of GW GP GM GC SW SP SM SC sand gravel as classified in accordance with ASTM D2487.

2.2 CONCRETE PIPE CRADLES

Concrete pipe cradles where indicated conforming to lines and dimensions indicated. Construct cradles with concrete having a 28 day compressive strength of 20.7 MPa (3000 psi).

PART 3 - EXECUTION

3.1 PROTECTION

3.1.1 Drainage and Dewatering

a. Drainage

Surface water shall be directed away from excavation and construction sites so as to prevent erosion and undermining of foundations. Diversion ditches, and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

3.1.2 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. Operate the dewatering system until construction work below existing water levels is complete.

3.1.3 Underground Utilities

The Contractor shall physically verify the location and elevation of the existing utilities prior to starting construction. The Contractor shall mark the surface of the ground where existing underground utilities are discovered.

3.1.4 Structures and Surfaces

Protect newly backfilled areas slopes, or grades from traffic, erosion settlement, or any other damage. Repair and reestablish damaged or eroded grades and slopes and restore surface construction prior to acceptance. Protect existing streams, ditches, and storm drain inlets from water-borne soil.

3.3 SURFACE PREPARATION

3.3.1 Stockpiling Topsoil

Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be wasted. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

3.3.2 Cutting Pavement, Curbs, and Gutters

Saw cut with neat, parallel, straight lines 300 mm (one foot) wider than trench width on each side of trenches and 300 mm (one foot) beyond each edge of pits. When the saw cut is within 300 mm (one foot) of an existing joint, remove pavement to the existing joint.

3.4 GENERAL EXCAVATION AND TRENCHING

Keep excavations free from water while construction is in progress. Notify the Engineer immediately in writing if it becomes necessary to remove rock or hard, unstable, or otherwise unsatisfactory material to a depth greater than indicated. Make trench sides as nearly vertical as practicable except where sloping of sides is allowed. Sides of trenches shall not be sloped from the bottom of the trench up to the elevation of the top of the pipe. Excavate ledge rock, boulders, and other unyielding material to an over depth at least 150 mm (6 inches) below the bottom of the pipe and appurtenances unless otherwise indicated or specified. Over excavate soft, weak, or wet excavations. Use bedding material placed in 150 mm (6 inch) maximum layers to refill over depths to the proper grade. At the Contractor's option, the excavations may be cut to an overdepth of not less than 100 mm (4 inches) and refilled to required grade as specified. Grade bottom of trenches accurately to provide uniform bearing and support for each section of pipe or structure on undisturbed soil, or bedding material as indicated or specified at every point along its entire length except for portions where it is necessary to excavate for bell holes and for making proper joints. Dig bell holes and depressions for joints after trench has been graded. Dimension of bell holes shall be only 13 mm (½ inch) greater than length, width, and depth of bell as required for properly making the particular type of jointto ensure that the bell does not bear on the bottom of the excavation. Trench dimensions shall be as indicated.

3.5 BEDDING

Bedding shall be of materials and depths as indicated for utility lines and utility line structures. Place bedding in 150 mm (6 inch) maximum loose lifts. Provide uniform and continuous support for each section of structure except at bell holes or depressions necessary for makingproper joints.

3.5.1 Concrete Cradles

Specified in lieu of other types of bedding for a particular type of pipe material, shall be as specified.

3.6 BACKFILLING

Construct backfill in two operations (initial and final) as indicated and specified in this section. Place initial backfill in 150 mm (6 inch) maximum loose lifts to 300 mm (one foot) above pipe unless otherwise specified. Ensure that initially placed material is tamped firmly under pipe haunches. Bring up evenly on each side and along the full length of the pipe, or structure. Ensure that no damage is done to the utility or its protective coating. Place the remainder of the backfill (final backfill) in 225 mm (9 inch) maximum loose lifts unless otherwise specified. Compact each loose lift as specified in the paragraph 3.7, "General Compaction" before placing the next lift. Do not backfill where the material in the trench is muddy, except as authorized. Provide a minimum cover from final grade of 600mm (2 feet) for storm drains and 1200 mm (3.9 feet) for sewer mains. Where settlements greater than the tolerance allowed herein for grading occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation. Coordinate backfilling with testing of utilities. Testing for the following shall be complete before final backfilling: water distribution, storm drainage and sanitary sewer.

3.7 COMPACTION

Use hand-operated, plate-type, vibratory, or other suitable hand tampers in areas not accessible to larger rollers or compactors. Avoid damaging pipes and protective pipe coatings. Compact material in accordance with the following unless otherwise specified. If necessary, alter, change, or modify selected equipment or compaction methods to meet specified compaction requirements.

3.7.1 Compaction of Material in Subcuts or Over excavations

In rock, compact to 95 percent of ASTM D1557 maximum density. In soft, weak, or wet soils, tamp refill material to consolidate to density of adjacent material in trench wall. In stable soils, compact to 90 percent of ASTM D1557maximum density.

3.7.2 Compaction of Pipe and Conduit Bedding

In rock, compact to 95 percent and in soil, compact to 90 percent of ASTM D1557 maximum density.

3.7.3 Compaction of Backfill

Compact initial backfill material surrounding pipes, or conduits, to 90 percent of ASTM D1557 maximum density except where bedding and backfill are the same material. Where bedding and backfill are the same material, compact initial backfill to the density of the bedding. Under areas to be seeded or sodded, compact succeeding layers of final backfill to 85 percent of ASTM D1557 maximum density. For utilities under road or highway right-of-way, structures and pavements compact layers of final backfill as specified under paragraph 3.8, "Special Earthwork Installation Requirements."

3.8 SPECIAL EARTHWORK INSTALLATION REQUIREMENTS

3.8.1 Concrete Culvert Piping Under Embankment

Construct the embankment to 150 mm (6 inches) above elevation of top of pipe for 600 mm (24 inch) size pipe and to 750 mm (30 inches) above elevation of top of pipe where the pipe diameter is larger than 600mm (24 inches). After pipe installation, backfill and compact in accordance with requirements stated in paragraphs 3.6, "Backfilling and 3.7, “Compaction."

3.8.2 Manholes and Other Appurtenances

Provide at least 300 mm (12 inches) clear from outer surfaces to the embankment or shoring. Remove rock as specified herein. Remove unstable soil that is incapable of supporting the structure to an overdepth of 300 mm (one foot) and refill with gravel or sand to the proper elevation. Stabilize soft, weak, or wet excavations as indicated. Refill over depths with gravel or sand to the required grade and compact to 90 percent of ASTM D1557 maximum density.

3.8.3 Compaction under Roads, Streets, and other Areas to be paved

Place final backfill in 150 mm (6 inch) maximum loose lifts. If a vibratory roller is used for compaction of final backfill, the lift thickness can be increased to 225 mm (9 inches). Compact all backfill surrounding pipes, conduits, and other structures to 90 percent of ASTM D1557 maximum density except compact the top 300 mm (12 inches) of subgrade to 95 percent of ASTM D1557 maximum density. Backfill to permit the rolling and compacting of the completed excavation with the adjoining material, providing the specified density necessary toenable paving of the area immediately after backfilling has been completed. Compaction requirements for materials in pavement sections above the subgrade level shall be as specified in Section 02300, "Earthwork for Structures and Pavement."

3.9 FINISH OPERATIONS

3.9.1 Grading

Finish to grades indicated within 30 mm (one-tenth of a foot). Grade areas to drain water away from structures. Grade existing grades that are to remain but have been disturbed by the Contractor's operations.

3.9.2 Spreading Topsoil

Clear areas to receive topsoil for the finished surface of materials that would interfere with planting and maintenance operations. Scarify subgrade to a depth of 50 mm (2 inches). Do not place topsoil when the subgrade is extremely wet or dry, or in other conditions detrimental to seeding, planting, or grading. Spread topsoil to a uniform depth of 100 mm (4 inches) over the designated areas.

3.9.3 Disposition of Surplus Material

Surplus or other soil material not required or suitable for filling, backfilling, or grading shall be wasted by disposition off the work site.

3.9.4 Protection of Surfaces

Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.10 FIELD QUALITY CONTROL

Test sand, gravel, bedding, backfill and topsoil for conformance to specified requirements. Test backfill to be used under roads and paved areas for conformance to special requirements. Test bedding and backfill for moisture-density relations in accordance with ASTM D1557 and as specified herein. Perform at least one of each of the required tests for each material provided. Perform sufficiently in advance of construction so as not to delay work. Provide additional tests as specified above for each change of source. Perform final tests on topsoil to ensure adjustment of parameters into the ranges specified. Perform densityand moisture tests in randomly selected locations and in accordance with ASTM D1556, ASTM D2922 and ASTM D3017 as follows:

a. Bedding and backfill in trenches: One test per 15 meters

(50 linear feet) in each lift.

b. Appurtenance structures: One test per 9 square meters

(100 square feet) or fractions thereof in each lift.

Where ASTM D2922 and ASTM D3017 are used to test field compaction densities, verify test results by performing at least one test per day using ASTM D1556 at a location already tested in accordance with ASTM D2922. Perform at least one additional test using ASTM D1556 for every ten tests performed with a nucleardevice, at locations checked in accordance with ASTM D2922.

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SECTION 02360 - SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL

PART 1 - GENERAL

1.1 SUBMITTALS

a. Samples

Pesticides: Submit on request, or may draw at any time and without prior notice, from stocks at the job site, samples of the pesticides used in this work. Should analysis, indicate such samples to contain less than the amount of active ingredient specified on the label, work performed with such products shall be repeated, with pesticides conforming to this specifications, at no additional cost to the Owner.

b. Qualifications of pesticides applicators: Submit data as required in the paragraph 1.2, “Qualifications of Pesticide Applicators”, prior to commencement of work.

c. Manufacturer’s Instructions

Pesticides: Submit a copy of manufacturer’s label.

d. Closeout Submittals

(1) Warranty
(2) Application report
(3) Submit documents signed and sealed by an officer of the Contractor

1.2 QUALIFICATIONS OF PESTICIDE APPLICATORS

The pesticide applicator’s principal business shall be pest control and the pesticide applicator shall be certified pesticide applicator.

1.3 DELIVERY, STORAGE AND HANDLING

Deliver pesticides to the project site in sealed and labeled containers in good condition as supplied by the manufacturer or formulator. Store, handle and use pesticides in accordance with manufacturer’s labels. Labels shall bear evidence of registration.

1.4 SAFETY REQUIREMENTS

Formulate, treat and dispose of termiticides and their containers in accordance with label directions. Draw water for formulating only from sites designated by the Owner’srepresentative and fit the filing hose with backflow preventer meeting local plumbing codes or standards. The filling operation shall be under the direct and continuous observation of a Contractor’s Representative to prevent overflow. Secure pesticides and related materials under lock and key when unattended. Ensure that proper protective clothing and equipment are worn and used during all phases of termiticide operation. Dispose of used pesticide containers off the project site.

1.5 WARRANTY

Furnish a three year written warranty against infections or reinfestations by subterranean termite of the building constructed under this contract. Perform annual inspections of the building. If live subterranean termite infestation or subterranean termite damage is discovered

during the warranty period, and the soil and building conditions have not been altered in the interim, the Contractor shall:

a. Retreat the soil and perform other treatment as may be necessary for the elimination of subterranean termite infestation.

b. Repair damage caused by termite infestation; and

c. Re-inspect the building approximately 180 days after the re-treatment.

1.6 QUALITY ASSURANCE

Application Report: Upon completion of this work, submit report identifying the type of operation, brand name and manufacturer of pesticide, formulation, concentration or rate of application used. Maintain daily records and submit copies of records when requested by the Owner's Representative.

PART 2 - PRODUCTS

2.1 PESTICIDES

Termiticides bearing currently approved for such use by the appropriate agency.

PART 3 - EXECUTION

3.1 VERIFICATION OF CONDITIONS

At the time of application, the soil shall have a sufficiently low moisture content to allow uniform distribution of the treatment solution throughout the soil. Do not make applications during or immediately following heavy rains or when conditions may cause runoff and create an environment hazard.

3.2 APPLICATION

a. Treatment Area: Apply termiticide to soil material which will be covered by or lie immediately adjacent to the buildings and structures so as to provide a protective barrier against subterranean termites.

b. Treatment Application: Apply termiticide as a coarse spray and in such manner as to provide uniform distribution onto the soil surface. Apply treatment prior to placement of a vapor barrier or waterproof membrane and at least 12 hours prior to concrete pouring. Where treated soil or fill material is not to be covered with a vapor barrier or waterproof membrane, exercise adequate precautions to prevent its disturbance. If soil or fill material has been disturbed after treatment, retreat as specified above before placement of slab or other covering structure. Coordinate treatment of the soil on the exterior sides of foundation walls, grade beams and similar structure with final grading and planting operations so as to avoid disturbance of the treated barriers by such operations. Observe manufacturer's warnings and precautions in the handling and use of such materials. Exercise precaution that these chemicals do not enter water supply systems or potable water supplies or aquafiers, and that they do not endanger plants as well.

Notify the Owner's Representative at least 48 hours prior to beginning of treatment and perform formulating, mixing and application in the presence of Owner's Representative.

c. Rates and Methods of Application: Apply in accordance with the pesticide label. Provide maximum application or dosage rates. Resolve conflict between this specification and the label direction in favor of the label.

3.3 METHOD OF MEASUREMENT

Soil Treatment or Termite Control shall be measured by the number of square meters applied and accepted.

3.4 BASIS OF PAYMENT

The accepted quantity measured as prescribed in Method of Measurement shall be paid for at the contract unit price for Soil Treatment or Termite Control which price and payment shall be full compensation for furnishing and placing all materials, including labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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DIVISION 7 – CONCRETE

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 Applicable Publications

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless specified, all publications below shall be of the latest edition.

1.1.1 American Concrete Institute (ACI) Publications:

ACI 224 R	Control of Cracking in Concrete Structures
ACI 301	Specifications for Structural Concrete for Buildings
ACI 302.1 R	Guide for Concrete Floor and Slab Construction
ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
ACI-305R	Hot-Weather Concreting
ACI 315	Details and Detailing of Concrete Reinforcement
ACI 318R	Building Code Requirements for Reinforced Concrete
ACI 347-R	Recommended Practice for Concrete Formwork
ACI 350R	Environmental Engineering Concrete Structures

1.1.2 American Society for Testing and Materials (ASTM) Publications:

C 39	Compressive Strength of Cylindrical Concrete Specimens
C 94	Ready-Mixed Concrete
C920	Elastomeric Joint Sealants
C 138	Test Methods for Unit Weight, Yield and Air Content (Gravimetric) or Concrete
C 231	Standard Test Method for Air Content of Freshly-Mixed Concrete by the Pressure Method
C 173	Standard Test Method for Air Content of Freshly-Mixed Concrete by the Volumetric Method
D 1751	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
1.1.3	American Welding Society (AWS) Publication:
D1.4	Structural Welding Code-Reinforcing Steel

1.1.4 Product Standards Agency (PSA) Publications:

a. Philippine National Standards:

PNS 07 Specifications for Portland Cement

PNS 18 Specifications for Concrete Aggregates

PNS 49 Specifications for Steel Bars for Concrete Reinforcement

b. Standards Administrative Order (SAO)

SAO-6 Philippine Plywood

1.2 Description of Work

The work includes the provision of cast-in-place concrete. In the ACI publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" has been substituted for "should" wherever it appears.

1.3 Submittals:

1.3.1 Shop Drawings

Reproductions of contract drawings are unacceptable.

a. Shop Drawings for Reinforcing Steel: ACI 315. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover.

Do not scale dimensions from structural drawings to determine lengths of reinforcing rods.

b. Shop Drawings for Formwork: ACI 347. Include design calculations indicating arrangement of forms, sizes and grade of supports (lumber), panels, and related components. Indicate placement schedule, construction, and location and method of forming control joints. Include locations of inserts, pipework, conduit, sleeves, and other embedded items. Furnish drawings and descriptions of shoring and reshoring methods, proposed for suspended slab, spandrel beams, and other horizontal concrete members. Furnish schedule of form removal of structures not included in paragraph 3.5.5 “Removal of Forms”.

c. Shop Drawings for Construction Joints: ACI 318. Drawings shall clearly indicate sequence of pouring for all footings, columns, beams and slabs.

1.3.2 Contractor Mix Design: Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Furnish a complete list of materials including type; brand; source and amount of cement and admixtures; applicable reference specifications; and copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Submit additional data regarding concrete aggregates if the source of aggregate changes.

1.3.3 Certified Laboratory Test Reports: Before delivery of materials, certified copies in 5 copies of the reports of all tests required in referenced publications or otherwise specified herein shall be submitted to and approved by the Owner’s Representative. The testing shall have been performed within one year of submittal of the test reports for approval by an independent laboratory approved by the Owner's Representative. Test reports on a previously tested

materials shall be accompanied by notarized certificates from the manufacturer certifying that the previously tested material is of the same type, quality, manufacture, and make as that proposed for use in this project. Certified test reports are required for the following:

a. Aggregates
b. Reinforcement
c. Cement

1.3.4 Certificates of Compliance:

a. Materials for Curing Concrete
b. Joint filler
c. Vapor barrier
d. Admixtures

1.3.5 Catalog Data:

a. Materials for curing concrete
b. Joint filler
c. Vapor barrier
d. Admixtures

1.4 DELIVERY AND STORAGE:

1.4.1 Cement

Cement in bags shall be stored in a suitable weatherproof structure which shall be as air-tight as practicable; floors shall be elevated above the ground a distance sufficient to prevent the absorption of moisture. Bags shall be stacked close together to reduce circulation of air but shall not be stacked against outside walls; the manner of storage shallpermit easy access for inspection and identification of each shipment. Bulk cement shall betransferred to elevated airtight and weatherproof bins. At the time of use all cement shall befree-flowing and free of lumps. Cement that has been in storage longer than 6 months will be tested by standard mortar tests or other tests as deemed necessary by the Owner's Representative to determine its suitability for use and such cement shall not be used withoutapproval of the Owner's Representative.

1.4.2 Aggregates

Aggregates shall be stored on areas covered with tightly laid wood planks, sheet metal, or other hard and clean surface, and in a manner that will preclude the inclusion of foreign material. Aggregates of different sizes shall be stored in separate piles. Stock piles of coarse aggregate shall be built in horizontal layers not exceeding 1.20 meters in depth to minimize segregation. Should the coarse aggregate become aggregated it shall be remixedto conform to the grading requirements.

1.4.3 Reinforcement

Store reinforcement of different sizes in racks raised above the ground with accurate identification. Protect reinforcing steel from contaminants such as grease, oil, and dirt.

1.4.4 Admixtures

Admixtures shall be stored in a manner that will not damage the containers.

PART 2 - PRODUCTS

2.1 CONCRETE

2.1.1 Contractor-Furnished Mix Design

ACI 211.1 and ACI 301. Unless indicated otherwise on the drawings, the following shall apply:

Location	28 Day Compressive Strength		Maximum Aggregate Size (mm)	Slump (max)
	MPa	psi		
Suspended Slabs, Beams and Girders	28	4,000	20	100mm
Columns and Pedestal	28	4,000	20	100mm
Footings and Footing Tie Beams	28	4,000	20	100mm
Slab on Grade	21	3,000	20	100mm
Retaining Walls	28	4,000	20	100mm
Stairs and Parapet (if any)	28	4,000	20	100mm
Other not indicated	28	4,000	20	100mm

2.2 MATERIALS

2.2.1 Cement

Cement shall conform to ASTM C150, Type I Portland Cement

2.2.2 Water

Water shall be fresh, clean, and potable.

2.2.3 Aggregates

Aggregate shall conform to ASTM C33, except as modified herein. Obtain aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement.

2.2.4 Non-shrink Grout

Non-shrink grout shall be non-metallic conforming to ASTM C 827.

2.2.5 Admixtures

a. Accelerating: ASTM C 494, Type C.

b. Retarding: ASTM C 494, Type B or D.

c. Water Reducing: ASTM C 494, Type A or E.

d. Air entraining, ASTM C 260

Percentage of air content shall be as required in ACI 318, ACI 201.2R and ASTM C 1116, as applicable.

e. Materials for Forms

Provide wood, plywood, or steel. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Plywood shall conform with SAO 6, Type I, Grade A or better surfaces. Steel form surfaces shall not contain irregularities, dents, or sags.

2.2.7 Reinforcement

a. Reinforcing Bars

Reinforcing bars shall conform to ASTM A 615 (Weldable). All reinforcing steel shall be deformed. Reinforcing steel shall have a minimum yield strength of 275 MPa (Grade 40) for bars dia. 12mm and smaller, and 414 MPa (Grade 60) for bars dia. 16 and larger.

2.2.8 Vapor Barrier

Vapor barrier shall be made of polyethylene sheet, minimum 6 mil thickness conforming to ASTM C 171.

2.2.9 Materials for Curing Concrete

a. Impervious Sheeting: ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

b. Pervious Sheeting: AASHTO M 182.

c. Liquid Membrane-Forming Compound: ASTM C 309, white-pigmented, Type 2, Class B, free of paraffin or petroleum.

d. Liquid Chemical Sealer-Hardener Compound: Compound shall not contain petroleum resins or waxes. Compound shall not reduce the adhesion of resilient flooring, tile, paint, waterproofing, or other material applied to concrete.

e. Expansion/Contraction Joint Filler: ASTM D 1751 or ASTM D1752.

f. Joint Sealants

g. Horizontal Surfaces (3 percent slope, maximum):

(1) Outside Buildings: ASTM D 1190.

(2) Inside Buildings: ASTM D 1190 or ASTM D 1850.

(3) Vertical Surfaces (greater than 3 percent slope): ASTM C 920, Type M, Grade NS, Class 25, Use T.

(4) Forms: ACI 301

(5) General Requirements

Forms shall be provided for all concrete not indicated or specified otherwise. Forms shall be set true to line and grade and maintained so as to insure

completed work within the allowable tolerance specified, and shall be mortar-tight. The Contractor shall be responsible for the adequacy of forms and form supports. Bolts and rods used for internal ties shall be arranged so that when the forms are removed, all metals will have concrete cover not less than that indicated in the drawings. Bolts or rod type form ties that must be removed when forms are removed shall not be used for watertightforms. Wire tire shall not be used where the concrete surface will be exposed to weathering and where discoloration will be exposed. All form work shall be provided with adequate clean-out openings to permit inspection and easy cleaning after all reinforcement has been placed. Where forms for continuous surfaces are placed in successive units, the forms shall be fitted over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Panel forms shall be constructed to provide tight joints between panels. All forms shallbe constructed so that they can be removed without damaging the concrete.All exposed joints, edges, and external corners shall be chamfered a minimum of 20 mm unless specified otherwise herein. Forms for heavy girders and similar members shall be constructed with a proper camber asindicated.

f. Materials for Forms

Forms shall be of wood, plywood, or steel. Wood forms for surfaces exposed to view in the finished structure and requiring a smooth form finish, shall be plywood. For unexposed surfaces, undressed square-edge lumber may be used. Forms for surfaces requiring special finishes shall be plywood, or shall be lined with plywood, a non-absorptive, hard-pressed fiberboard, absorptive-type lining or other suitable material. Plywood, other than for lining, shall be concrete-form plywood not less than 16 mm thick free of raised grain, torn surfaces, worn edges, patches, or other surface defects which would impair the texture of the concrete surface. Surfaces of steel forms shall be free from irregularities, dents, and sags.

g. Coating

Before placing the concrete, the contact surfaces of forms shall be coated with a non-staining mineral oil or suitable non-staining form coating compound or shall be given two coats of nitrocellulose lacquer, except as specified otherwise. Mineral oil shall not be used on forms for surfaces which are to be painted. For surfaces not exposed to view in the finished structure, sheathing may be wetted thoroughly with clean water. All excess coating shall be removed by wiping with cloths. Reused forms shall have the contact surfaces cleaned thoroughly; those which have been coated shall be given an additional application of the coating. Plaster waste molds shall be sized with two coats of thin shellac or lacquer and coated with soft or thinned non-staining grease.

h. Tolerance and Variations

The Contractor shall set and maintain concrete forms to ensure that, after removal of the forms and prior to patching and finishing, no portion of the concrete work will exceed any of the tolerances specified. Variations in floor levels shall be measured before removal of supporting shores. The Contractor shall be responsible for variations due to deflection, when the latter results from concrete quality or curing other than that which has been specified. The tolerances specified shall not be exceeded by any portion of any concrete surfaces; the specified variation for one element of the

structure will not be applicable when it will permit another element of the structure to exceed its allowable variations except as otherwise specified herein, tolerances shall conform to ACI 347.

PART 3 - EXECUTION

3.1 PROPORTIONING, MEASUREMENT AND MIXING

ASTM, C94, ACI 301, ACI 302.1R, and ACI 304, except as modified herein.

3.1.1 Proportioning of Materials

Proportioning of materials shall be accomplished by weighing, except as otherwise provided herein. In urgent situations, volumetric proportioning may be used temporarily, if permitted by the Owner's Representative, who will stipulate the length of the period during which volumetric proportioning may be used. The Contractor shall furnish the necessary equipment and shall establish accurate procedures for determining the quantities of free moisture in the aggregates, the true volume of the fine aggregate if volumetric proportioning is used, and the air content of the freshly mixed concrete if air-entrained concrete is used. Moisture, volumetric, and air determinations shall be made at intervals as directed by the Owner's Representative as specified herein under Sampling and testing requirements. Allowable tolerances for measuring cement and water shall be one percent; for aggregates 2 percent and for admixtures 3 percent.

a. Weight Measurement

The fine aggregate and each size of coarse aggregate shall be weighed separately. Cement in standard packages shall be weighed on a scale separate from that used for weighing the other materials.

b. Volumetric Measurement

The weight proportions shall be transposed into equivalent volumetric proportions by weighing representative samples of the aggregates in the condition in which they will be measured and in accordance with ASTM C 29. In determining the true volume of the fine aggregate, allowance shall be made for the bulking effect from the moisture contained therein. Suitable allowances shall also be made for variations in the moisture conditions of the aggregates.

3.1.2 Mixing

All concrete shall be machine mixed. In emergencies, the mixing may be done by hand if so authorized by the Owner's Representative. Mixing shall begin within 30 minutes after the cement has been added to the aggregates. The time of mixing after all cement and aggregates are in the mixer drum shall be not less than one minute for mixers having a capacity of one cubic yard or less; for mixers of larger capacities, the minimum time shall be increased 15 seconds for each additional cubic yard or fraction thereof of additional capacity. A reduction in the aforementioned mixing time shall be permitted in accordance with ASTM C 94 if mixer performance tests made at the Contractor's option and at his expense, indicate adequate mixing with the reduced time. All mixing water shall be introduced in the drum before one-fourth of the mixing time has elapsed. The entire contents of the mixer drum shall be discharged before recharging. The time elapsing between the introduction of the mixing water to the cement and aggregates or the cement to the aggregates and placing of the concrete in final position in the forms shall not exceed 60 minutes if the air temperature is less than 30 degrees C and 45 minutes if the air temperature is equal or greater than 30 degrees C. The retempering of concrete, i.e., remixing with or without additional cement, aggregate, or water, is not permitted.

3.1.3 Ready Mixed Concrete

Ready-mixed concrete shall conform to ASTM C 94 as modified herein. Ready-mixed concrete is defined in this specification as concrete produced regularly by a commercial establishment and delivered to the purchaser in the plastic state. Ready-mixed concrete may be used provided that (a) the plant has sufficient capacity and transportation equipment to deliver the concrete at the rate desired, and (b) the plant meets the requirements specified herein for equipment, measurement of materials, and mixing, except as modified herein. The cement, aggregates, water and admixtures shall conform to all applicable requirements of this specification. Ready-mixed concrete not specified otherwise herein shall be mixed and delivered by one of the following methods.

a. Truck Mixing

Concrete shall be mixed and delivered in a truck mixer. Mixers shall be charged with a ribbon fed mixture of aggregates and cement, or in the absence of facilities forribbon feeding, the aggregates shall be charged before the cement. When mixing isbegun during or immediately after charging a portion of the mixing water not in excess of that required to produce the minimum acceptable slump, shall be added ahead of or with, the other ingredients. Total mixing shall be for not less than 50 normore than 100 revolutions of the drum at the manufacturer's rated mixing speed after all ingredients including water are in the drum except as follows: After 30 to 75 revolutions of the drum the slump shall be tested and additional water shall be added if necessary to produce the required slump; if additional water is necessary, mixing shall be continued for at least 20 revolutions after the water is added. Mixing speed shall be not less than 16 rpm for open-top mixers, and not less than 4 rpm nor more than 16 rpm for open-top mixers. Any turning of the drum during transportation shall be at the speed designated by the manufacturer of the equipment, as agitating speed. Each batch of concrete delivered at the job site shallbe accompanied by a time slip issued at the batching plant, bearing the time of departure therefrom and the signature of the inspector. Discharge of concrete from the drum shall be completed within one hour or before the drum completes 250 revolutions after the introduction of water to the cement and the aggregates.

b. Combination Central Plant and Truck Mixing (Shrink Mixing)

Concrete shall be partially mixed in a central plant mixer and the mixing completed in a truck mixer. The mixing time in a central-plant mixer shall be the minimum required to intermingle the ingredients and shall not exceed 30 minutes. The mixing shall be completed in a truck mixer as specified herein under truck mixing.

c. Central-Plant Mixing

Concrete shall be mixed completely in a stationary mixer at a plant and transported to the site of the work in a truck agitator or a truck mixer operating at a speed of rotation designated by the manufacturer as agitating speed. Mixing shall begin within 30 minutes after cement has been added to aggregates. When authorized in writing by the Owner's Representative, non-agitation equipment approved by him may be used for transporting concrete. The time lapse between the introduction of the mixing water to the cement and aggregates and the placing of concrete in final position in theforms, shall not exceed: (a) for agitating equipment - 60 minutes, air temperature less than 30 degrees C; (b) for non-agitating equipment - 30 minutes.

d. Consistency of Concrete

Slump shall be determined in accordance with ASTM C 143. Samples for slump determination shall be taken from the concrete during placing in the forms.

3.2 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS: ACI 301

3.2.1 General Requirements

All reinforcement bars, stirrups, hanger bars, wire fabric, spirals and other reinforcing materials shall be provided as indicated in the drawing or required by this specification, together with all necessary wire ties, chairs, spacers, supports and other devices necessary to install and secure the reinforcement properly. All reinforcement, when placed, shall be free from rust, scale, oil, grease, clay, and other coatings, and foreign substances that would reduce or destroy the bond. Rusting of reinforcement shall not reduce the effective cross sectional area of the reinforcement to the extent that the strength is reduced beyond specified values. Heavy, thick rust or loose, flaky rust shall be removed by rubbing with burlap or other approved method, prior to placing. Reinforcement which has bends not shown on the project drawings or on approved shop drawings, or is reduced in section by rusting such that its weight is not within permissible ASTM tolerances, shall not be used. All reinforcement shall be supported and wired together to prevent displacement by construction loads or by the placing of concrete. Unless directed otherwise by the Engineer, reinforcement shall not be bent after being partially embedded in hardened concrete. Detailing of reinforcing shall conform to ACI 315. Where cover over reinforcing steel is not specified or indicated it shall be in accordance with ACI 318.

3.2.2 Placing

Reinforcement shall be placed accurately and secured. It shall be supported by suitable chairs and spacers or by metal hangers. On the ground, and where otherwise subject to corrosion, concrete or other suitable non-corrodible material shall be used for supporting reinforcement. Where the concrete surface will be exposed to the weather in the finished structure or where rust would impair the appearance or finish of the structure, all reinforcement supports, within specified concrete cover, shall be galvanized or made of a suitable non-corrodible material.

3.2.3 Splicing of Reinforcement

Splicing of reinforcement shall be in accordance with ACI 318, except as indicated otherwise or modified herein. Where splices in addition to those indicated on the drawings are necessary, they shall be approved by the Owner's Representative prior to their use. Splices shall not be made in beams, girders, and slabs at points of maximum stress. Butt splicing shall preferably be used over lapping for bar sizes larger than 32 mmϕ. Splices to be welded shall conform to AWS D 1.4; certification of weld ability of the reinforcement by the manufacturer, shall be submitted to the Owner's Representative. If the Contractor elects to use butt splicing of reinforcing, he shall submit complete details of the process to be used to the Owner's Representative. If butt splices are used the Contractor shall ensure that the splice meets the requirements specified herein by performing at least three splices which shall be submitted for tests to a testing laboratory that has been approved for such testing by the Owner's Representative. The cost of these shall be borne by the Contractor.

3.2.4 Moving Reinforcing Steel

All placement or movement of reinforcing steel after placement, to positions other than indicated or specified, shall be subject to the approval of the Owner's Representative.

3.2.5 Concrete Protection for Reinforcement

Concrete protection for reinforcement shall be as indicated; or if not indicated, in accordance with ACI 318.

3.2.6 Tolerances and Variations

The minimum concrete cover for reinforcement specified in the contract documents takes precedence over all permissible reinforcement-placement variations; nothing in the variations listed below is to be construed as permitting violation or compromise thereof:

a.	Height of bottom bars	plus or minus 6 mm. above form
b.	Lengthwise positioning	plus or minus 50 mm. of bars
c.	Spacing bars in walls	plus or minus 25 mm. and solid slabs
d.	Spacing bars in	minus 0 mm plus 6 mm. beams and footings
e.	Height of top bars	minus 0 mm plus 6 mm.
f.	Stirrup spacing	
	(1) For any one stirrup	plus or minus 25 mm.
	(2) For over-all group	plus or minus 25 mm. of stirrups

3.2.7 Vapor Barrier: Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 300 mm. Remove torn, punctured, or damaged vapor barrier material and provide with new vapor barrier prior to placing concrete. Concrete placement shall not damage vapor barrier material.

3.2.8 Setting Miscellaneous Material: Anchors and bolts, including but not limited to those for machine and equipment bases; frames or edgings, hangers and inserts, door bucks, pipe supports, pipe sleeves, pipes passing through walls, metal ties, conduits, flashing reglets, drains and all other materials in connection with concrete construction shall, where practicable be placed and secured in position when the concrete is placed. Anchor bolts for machines shall be set to templates, shall be plumbed carefully and checked for location and elevation with an instrument, and shall be held in position rigidly to prevent displacement while concrete is being placed.

3.3 CONVEYING AND PLACING CONCRETE

ACI 301 and ACI 304, except as modified herein.

3.3.1 Conveying: Concrete shall be conveyed from the mixer to the forms as rapidly as practicable by proper methods which will not cause segregation or loss of ingredients. It shall be deposited as nearly as practicable in its final position in the forms. At any point in the conveying, the free vertical drop of the concrete shall not exceed 1 m. Conveying equipment shall be cleaned thoroughly before each run. All concrete shall be deposited as soon as practicable after the forms and the reinforcement have been inspected and approved by the Owner's Representative. Concrete which has segregated in conveying shall be removed anddisposed of as directed by the Owner’s Representative.

3.3.2 Placing Concrete: No concrete shall be placed after there is evidence of initial set. Concrete placement will not be permitted when weather conditions prevent proper placement and consolidation. The placement of concrete in uncovered areas during periods of precipitation will not be allowed except for covered areas. Subgrades of earth or other material shall be properly prepared and, if necessary, covered with heavy building paper or other suitable

material to prevent the concrete from becoming contaminated. Before placing concrete on porous subgrades, they shall be dampened. Forms shall be clean of dirt, construction debris and water. Fresh concrete shall not be placed on vertical supporting members such as columns and walls without approval of the Owner's Representative. Concrete shall be deposited in approximately horizontal layers, 300 mm to 500 mm deep in a manner to preclude the formation of cold joints between successive layers.

3.3.3 Vibration: All concrete shall be compacted with high frequency, internal mechanical vibrating equipment supplemented by hand spading and tamping. Concrete slabs 100 mm or less in depth shall be consolidated by wood tampers, spading and settling with a heavy leveling straight edge. Vibrators shall be designed to operate with vibratory element submerged in the concrete, and shall have a frequency of not less than 6,000 impulses per minute when submerged. The vibrating equipment shall be adequate at all times in number of units and power of each unit to consolidate the concrete properly. Vibration of forms and reinforcement shall not be employed except when authorized specifically by the Owner’s Representative. Vibrators shall not be used to transport the concrete in the forms. Vibration shall be discontinued when the concrete has been compacted thoroughly and ceases to decrease in volume.

3.3.4 Construction Joints: Joints not shown on the drawings shall be made and located so as to least impair the strength of the structure and shall be subject to approval of the Owner’s Representative. In general, they shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joints inthe girders shall be offset a distance equal to twice the width of the beam. Horizontal joints inwalls and columns shall be at the underside of floors, slabs, beams, or girders and at the top offootings or grade slabs. Beams, girders, brackets, column capitals, haunches and drop panelsshall be placed at the same time as slabs. Joints shall be perpendicular to the mainreinforcement.

a. Reinforcement in Construction Joints

All reinforcing steel shall be continued across joints. Keys and inclined dowels shall be provided as indicated. Longitudinal keys at least 38 mm deep shall be provided in all joints in walls.

b. Preparation of Surface

The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed.

c. Bonding

When a bonded construction joint is required, bond shall be obtained by one of the following methods:

(i) The use of suitable chemical retardant which delays but does not prevent setting of the surface mortar. Retarded mortar shall be removed within 24 hours after placing to produce a clean exposed aggregate bonding surface.

(2) By roughening the surface of the concrete in proper manner, which will expose the aggregate uniformly and will not leave laitance, loosenedparticles of aggregate, or damaged concrete at the surface.

3.3.5 Embedded Items

a. Other Embedded Items

All sleeves, inserts, anchors and embedded items required for adjoining work or for its support shall be placed prior to concreting. All sub-contractors, whose work is related to the concrete or must be supported by it, shall be given ample notice and opportunity to introduce or furnish embedded items before the concrete is placed. All ferrous metal sleeves, inserts, anchors and other embedded ferrous items exposed to the weather or where rust would impair the appearance or finish of the structure shall be galvanized.

b. Placing Embedded Items: Expansion joint material, and embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids. Aluminum shall not be embedded in concrete except where aluminum is protected from direct contact with the concrete.

c. Reinforcing Bars: Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items, but not so as to impair design strengths of the members. If bars are moved more than one bar diameter, the resulting arrangement of bars shall be subject to the approval of the Owner's Representative.

3.3.6 Placing Concrete in Hot Weather

Placing concrete in hot weather shall be in accordance with ACI 305 except as modified herein. In hot weather, extra care should be made to prevent rapid drying of newly placed concrete. When the outdoor ambient temperature is more than 32 degrees C; the temperature of the concrete as placed shall not exceed 32 degrees C; the fresh concrete shall be shaded as soon as possible after placing; and curing shall be started as soon as the surface of the fresh concrete is sufficiently hard to permit it without damage.

3.4 SURFACE FINISHES (EXCEPT FLOOR AND SLAB ON GRADE)

3.4.1 Repair of Surface Defects

All surface defects including tie holes, minor honeycombing, and other defective concrete shall be repaired with cement mortar with the approval of the Owner's Representative. Cement mortar for patching shall be the same composition as that used in the concrete, except that for exposed surfaces part of the cement shall be white portland cement to provide a finish color matching the surrounding concrete. Patching shall be done as soon as the forms are removed; areas of surfaces, which are to be cured with a curing compound, shall be covered during the application of the compound. All areas to be patched shall be cleaned thoroughly. Minor honeycombed or otherwise defective areas shall be cut out to solid concrete to a depth of not less than 25 mm. The edges of the cut shall beperpendicular to the surface of the concrete. The area to be patched and at least 150 mm adjacent thereto shall be saturated with water before placing the mortar. The mortar shall be mixed approximately one hour before placing and shall be remixed occasionally during thisperiod with a trowel without the addition of water. A grout of cement and water mixed to the consistency of paint shall then be brushed onto the surfaces to which the mortar is to be bonded. The mortar shall be compacted into place and screened slightly higher than the surrounding surface. Patches shall be cured as specified for the concrete. Holes extending through the concrete shall be filled by means of a plunger type gun or other suitable device from the unexposed face. The excess mortar shall be wiped off the exposed face with a cloth. Finished surfaces shall be protected from stains and abrasions as cast finish against

steel, plywood, forms, and rubbed finish shall be equal in workmanship, texture, and general appearance to that of sample panels specified herein. Concrete with excessive honeycombing, which exposes the reinforcing steel or other defects which affect the structural strength of the member, shall be rejected or the defects corrected as directed by the Owner's Representative, and at the expense of the Contractor.

3.4.2 Finishing of Formed Surfaces

Finishing of formed surfaces shall be accomplished as soon as practicable after form removal and repair of surface defects. Finishing shall be accomplished and specified herein where indicated.

a. As Cast Finishes

b. Smooth Form Finish: The form facing material shall produce a smooth, hard, uniform texture on the concrete. Tie holes and defects shall be patched. All fins shall be completely removed.

c. Rough Form Finish: No selected form facing materials are required for rough form finish surfaces. Tie holes and defects shall be patched. Fins exceeding 6 mm in height shall be chipped off or rubbed off. Otherwise, surfaces shall be left with the texture imparted by the forms.

3.4.3 Unindicated Finish

Finishes not indicated on the drawings shall be as follows.

a. Smooth Form Finish

For all concrete surfaces exposed to public view.

b. Rough Form Finish

For all concrete surfaces not exposed to public view.

3.4.4 Unformed Surfaces

a Related Unformed Surfaces

Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of the adjacent formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

3.5 CURING AND PROTECTION (Except Floors)

ACI 301 unless otherwise specified.

3.5.1 General Requirements

Concrete shall be protected adequately from injurious action by sun, rain, flowing water, and mechanical injury, and shall not be allowed to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Curing shall be accomplished by moist curing, or by application of liquid chemical or liquid membrane forming compound, except as specified otherwise herein. Membrane forming compound shall not be used on surfaces for which special finish is specified, on any surface to be painted, waterproofed,

tiled, roofed, or where coverings are to be bonded. Completion of curing shall be initiated immediately following the removal of forms.

3.5.2 Moist Curing

a. Mats

The entire surface of the concrete shall be covered with two thicknesses of wet burlap weighing not less than 250 gram per square meter, dry weight, mats, or other suitable material having high absorptive quality. The material shall be thoroughly wet when applied and shall be kept continuously wet during the time it remains on the slab. Mats shall be made of clean material which is free from any substance which will have a deleterious effect on the concrete; they shall be at least as long as the width of the concrete under construction. During application, the mats shall not be dragged over the finished concrete nor over mats already placed; shall they be placed to provide complete coverage of surface and edges of the pavement with a slight overlap over adjacent mats. These mats shall be left in place not less than 7 days during which time they shall be kept wet continuously.

b. Impervious-Sheeting Curing: The entire exposed surface shall be wetted thoroughly with a fine spray of water and then covered with (a) waterproofed paper, (b) polyethylene-bonded water-proof paper sheeting, (c) polyethylene-coated burlap sheeting, or (d) polyethylene sheeting, as specified elsewhere herein. Sheets shall be laid directly on the concrete surface and overlapped 300 mm when a continuous sheet is not used. The curing medium shall be not less than 450 mm wider than the concrete surface to be cured, and shall be weighed down by placing a bank of moist earth on the edges just outside the forms and over the transverse laps to form closed joints. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.5.3 Liquid Membrane-Forming Compound Curing

Liquid membrane-forming compound curing shall be accomplished by applying a white-pigmented liquid compound, free of paraffin or petroleum, over the concrete surface torestrict evaporation of the mixing water. All joint openings except sawed joints shall be sealed at the top by inserting moistened paper or fiber rope, or covering with strips of waterproof material, prior to application of the curing compound, in a manner to prevent thecuring compound from entering the joint. Seven days following the placing of the liquid membrane forming compound shall be considered as the end of the curing period and the basis for determining when joint sealing material will be placed in joints.

a. Application of Curing Compound

The compound shall be applied immediately after the surface losses its water sheen and has a dull appearance and before joints are sawed. Curing compound shall be agitated thoroughly by mechanical means during use and shall be applied uniformly in a 2-coat continuous operation by suitable power-spraying equipment. The total coverage for the two coats shall be between 4 to 5 square meter per liter of undiluted compound. The compound shall form a uniform, continuous, coherent filmthat will not check, crack or peel and shall be free from pinholes or other imperfections. An additional coat of the compound shall be applied immediately toareas where the film is defective. Suitable covering other than liquid curing compound, shall be kept readily available for use to protect the freshly placed concrete in the event conditions occur which prevent correct application of the compound at the proper time. Concrete surfaces that are subject to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed with

two coats of curing compound by the method and at the foregoing coverage rate specified, at no additional cost to the Owner.

b. Protection of Treated Surfaces

Concrete surfaces to which liquid membrane-forming compounds have been applied shall be kept free from all foot and vehicular traffic and all other sources of abrasion for not less than 72 hours. Continuity of the coating shall be maintained for the entire curing period and any damage to the coating during this period shall be repaired immediately.

c. Liquid Chemical Sealer-Hardener Curing

Apply sealer-hardener to interior floors not receiving floor covering and floors located under access flooring. Apply the sealer-hardener in accordance with manufacturer's recommendations. Seal or cover joints and opening in which joint sealant is to be applied as required by the joint sealant manufacturer. The sealer-hardener shall not be applied until the concrete has cured for a minimum of 30 days. Apply a minimum of 2 coats of sealer-hardener.

3.5.4 Curing Periods

When the 7-day compression-test-cylinders, representative of parts of a structure already placed, indicate that the 28-day strengths may be less than 90 percent of the design strengths, those parts of the structure shall be given additional curing, as directed by the Owner. Cast-in-place parts of a structure which will be permanently submerged in fresh water may be cured for not less than 12 hours, provided they are submerged immediately thereafter. Curing, except steam curing, shall be as follows:

Time (minimum)	Concrete Element
7 days	All concrete not specified otherwise

3.5.5 Removal of Forms and Protection: Forms shall be removed in a manner, which will prevent damage to the concrete. Forms shall not be removed without approval of the Engineer, or before the expiration of the minimum periods specified herein:

	Days After Placing
Side forms on beams, girders and columns	1
Forms for columns	7

	Days After Placing
Supporting forms for slabs, beams, girders	14

Sufficient shoring members to support dead load plus construction loads on beams, girders and slabs shall be provided for a period of 7 days in addition to the 14 days specified herein.

3.5.6 Special Requirements for High-Early-Strength Portland Cement Concrete: The curing periods, minimum periods during which supporting forms and shores shall be left in place, and minimum periods for maintaining curing temperatures shall be not less than one-quarter

of those specified herein for Portland cement concrete, but in no case less than 48 hours.

3.6 SAMPLING AND TESTING:

3.6.1 Sampling

a. Aggregates

Prior to production and delivery of aggregates, at least one initial sample shall be taken at the source. Each sample shall be collected by taking three incremental samples at random from the source material to make a composite sample of not less than 20 kilograms. Three random samples shall then be taken from each 270 metric tons of material, or a day's run, whichever is the least amount, during the course of the project. Three increments shall be taken from the same vehicle at the central plant during unloading. The above sampling shall be repeated when the source of material is changed or when unacceptable deficiencies or variations from the specified grading of materials are found in testing.

b. Coarse Aggregates: A 20 kilograms or larger sample for analysis as specified herein shall be taken 2 times daily with a sampling device approved by the Owner's Representative. The samples shall be taken from the conveyor belt. The plant shall be brought up to full operation before samples are taken. The samples shallbe taken so that a uniform cross-section, accurately representing the materials onthe belt or in the bins, is obtained. Random checks of the sampling may be madeby the Owner's Representative. Additional sampling is required when analyses show deficiencies or unacceptable variances or deviation from the specified requirements.

c. Fine Aggregates: A 20 kilogram-sample shall be taken as specified herein for sampling of fine aggregate. The sample shall be taken at least 2 times daily for sieve analysis of fine aggregate sand and specific gravity tests. Additional samplesmay be required when analyses show deficiencies, unacceptable variances, or deviations. Sampling can be reduced to 1 time daily when test results show that the fine aggregates consistency meet specified requirements. Samples of sand shall be taken when the sand is moist.

d. Sample Identification: Each sample shall be contained in a clean container which shall be securely fastened to prevent loss of material. It shall be tagged for identification. The tag shall contain the following information:

Contract No. _____

Sample No._____Quantity _____

Date of Sample _____

Sampler _____

Source _____

Intended Use _____

For Testing _____

e. Concrete: ASTM C 172. Samples for strength tests of concrete placed each day shall be taken not less than once a day, nor less than once for each 50 cubic meters of concrete, nor less than once for each 400 sq.m. of surface area for slabs or walls.

Nine (9) cylinders shall be molded from each day sample.

3.6.2 Testing

a. Aggregate Testing: Gradation tests shall be made on each sample without delay. All other aggregate tests required by this specification shall be made on the initial source samples, and shall be repeated whenever there is a change of source. The tests shall include an analysis of each grade of material and an analysis of the combined material representing the aggregate part of the mix.

b. Cement:

c. The Contractor's inspection shall be performed in accordance with PNS 07. The Contractor's certification shall include:

(1) A report of the mill test results signed by the laboratory chemist;

(2) At the time of shipment from the mill or other storage point, a manufacturer's certificate that the cement was tested in accordance with the specified requirements.

(3) A statement that the concrete for the project will contain cement conforming to the specified requirements.

The Contractor shall make all necessary arrangement with the cement supplier and carrier for the identification and transportation of the certified cement from the manufacturer to the concrete batch plant.

d. At any time the cement stored at the concrete plant or other storage area is not certified by the cement manufacturer for use in the project, or if the Contractor desires to use cement of a different brand or type which is not certified by the cement mill, the Contractor shall, before using the cement, secure three random samples of the cement in storage, and arrange for complete chemical and physicaltests by an Owner approved cement testing laboratory to provide information as to the properties of the cement. Test results of each individual sample shall be reported; acceptance will be determined on the average test result of the three samples for the selected lot size. Cement not meeting the specified requirements shall not be used in the concrete. Each shipment of acceptable cement as determined by field tests shall be sampled, the samples identified and stored for notless than 42 days. A random sample shall be tested for conformance at least onceeach month. The sampling and testing shall continue until subsequent shipments of cement are certified by the cement producer.

e. The Owner reserves the right to inspect and sample at the source or at the site of work all cement to be used on the project.

f. Concrete Testing:

. Testing consistency of concrete slumps shall be determined in accordance with ASTM C 143. Consistency may be determined in the field by means of the ball-penetration method in accordance with ASTM C 360 after a correlation betweenslump and ball-penetration is determined. Tests to verify the ratio will be made at least once each working day. Samples for slump determination will be taken from the concrete during placing in the forms; samples for ball-penetration shall be takenas specified in ASTM C 360. Tests shall be made as follows:

1. At the beginning of a concrete placement operation and at subsequent

intervals to insure that the specification requirements are met.

2. Whenever test cylinders are made.

Compressive Tests: Testing of specimen for compressive strength shall be in accordance with ASTM C 39. Test two (2) cylinders at seven (7) days, six (6) cylinders at twenty eight (28) days and hold one (1) cylinder in reserve. When a satisfactory relationship between 7-day and 28-day strength has been established, the 7-day test results may be used as an indicator of the 28-day strength. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days. If the average of the three strength test result is less than f'c or if any strength test result falls below f'c by more than 3.5 MPa (500 psi), take a minimum of three ASTM C42 core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core tests shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strength shall be retested. Demolition and concrete replacement if recommended shall be borne by the Contractor.

Air Content Tests: Test methods for air content of concrete shall comply with ASTM C-138, C 173 and C 231 as applicable.

3.7 METHOD OF MEASUREMENT

The quantity of structural concrete, reinforcing steel or other Contract Pay Items shall constitute the completed and accepted structure which shall be measured for payment in the manner prescribed in the several items involved.

3.8 BASIS OF PAYMENT

The quantities measured as provided in the Method of Measurement shall be paid for at the contract price for the several pay items which price and payment shall be full compensation for furnishing, preparing, fabricating, placing, curing and for all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section. Such payment shall constitute full payment for the completed structure ready for use.

Payment will be made in accordance with the Bill of Quantities.

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DIVISION 8 – MASONRY

SECTION 04800 - REINFORCED MASONRY (CHB)

PART 1 - GENERAL

1.1 Applicable Publications

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless specified, all publications below shall be of the latest edition.

1.1.1 American Concrete Institute (ACI) Publication:

Manual of Standard Practice for Detailing Reinforced Concrete Structures

1.1.2 American Society for Testing and Materials (ASTM) Publications:

C 39	Compressive Strength of Cylindrical Concrete Specimens
C 91	Masonry Cement
C 144	Aggregate for Masonry Mortar
C 270	Mortar for Unit Masonry
C 404	Aggregates for Masonry Grout
C 426	Drying Shrinkage of Concrete Block
D 1056	Flexible Cellular Materials-Sponge or Expanded Rubber
D 1667	Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed Cell Sponge) E 447 Compressive Strength of Masonry Prisms

1.1.3 Product Standards Agency (PSA) Publications (Philippines):

PNS 07	Specifications for Portland Cement
PNS 16	Specifications for Concrete Hollow Blocks
PNS 18	Specifications for Concrete Aggregate
PNS 49	Specifications for Steel Bars for Concrete Reinforcement
SAO 181	Industrial Quicklime and Hydrated Lime

1.2 Definitions

1.2.1 Concealed Masonry Surfaces:

a. Surfaces of foundation walls against which backfill is placed.

b. Surfaces covered by furring and wallboard plaster, stucco, or masonry facings.

c. Surfaces above suspended ceilings.

d. Surfaces within attic spaces, crawl spaces, pipe or duct chases and elevator shafts.

1.2.2 Exposed Masonry Surfaces

Masonry surfaces other than those listed above including those to be painted.

1.2.3 Grout Lift and Grout Pour

A grout lift is the layer of grout placed in a single continuous operation. A grout pour is the entire height of grout fill placed in one day and is composed of a number of successively placed grout lifts.

1.2.4 Reinforced Hollow Unit Masonry

Hollow concrete masonry units reinforced vertically and horizontally with steel bars located within cells or kerfs in the units and with cells containing reinforcing bars filled solidly with grout.

1.2.5 Additional Definitions:

a. Back-Up: That part of masonry walls which is behind the exterior facing.

b. Bed Joint: The horizontal layer of mortar on which a masonry unit is laid.

c. Head Joint: The vertical mortar joint between ends of masonry units. Sometimes

d. Kerf: A cut or notch made with a saw, or with a cutter, part way through a portion of a unit.

e. Low Lift Grouting: The technique of grouting masonry in 0.20 to 1.8 meters lifts as the wall is being laid.

f. Reinforced Masonry: Masonry in which reinforcement is embedded in such a manner that the component act together to resist lateral forces.

1.3 Delivery, Storage and Handling

Handle, store and protect masonry units to avoid chipping, breakage or contact with the soil. Keep steel reinforcing bars free of rust and loose scale. Reject rusted steel reinforcing bars. Deliver cement and lime in unbroken bags, barrels, or other sealed containers. Keep cementitious materials dry. Store and handle cement to prevent the inclusion of foreign materials. Store aggregates in a manner to avoid contamination or segregation. Plainly mark and label containers with the manufacturer's names and brands.

PART 2- PRODUCTS

2.1 Masonry Units

2.1.1 Concrete Masonry Units (CHB):

a. Aggregates: ASTM C33

b. Linear Drying Shrinkage: Not to exceed 0.065 percent when tested in accordance with ASTM 426.

c. Kinds and Shapes: In addition to the requirements specified, concrete masonry units of the various kinds shall conform to PNS 16, Type II for 150 mm thick(f'm = 7 MPa / 5 MPa) and for 100 mm thick (f'm = 2.5 MPa). Include closer, jamb, lintel and bond beam units and special shapes and sizes to complete the work as indicated.

2.2 Centering Device

Provide centering clips that prevent displacement of reinforcing bars during the course of construction.

2.3 Deformed Reinforcing Bars

ASTM A615, Grade 275 (40,000 psi).

2.4 Materials for Mortar and Grout

2.4.1 Admixtures

a. Admixtures: May be used in mortar or grout provided that the admixture does not adversely affect bond or compressive strength of mortar or grout.

b. Prohibited Ingredients: Do not use air entraining compounds, calcium chloride salts or other chemicals that will adversely affect metals or the coatings of metals embedded in the mortar or grout.

2.4.2 Aggregate for Mortar

ASTM C 144, except that not less than 3 percent nor more than 15 percent shall pass the No. 100 sieve. Aggregate used in mortar for joint 6 mm or less shall have 100 percent passing the No. 8 sieve with 10 percent being retained on the No. 16 sieve.

2.4.3 Aggregate for Grout:

a. Fine Aggregate: ASTM C 404, Size No. 2 or ASTM C 144.

b. Pea Gravel: ASTM C 404, except that 100 percent shall pass the 9 mm screen and not more than 5 percent shall pass the No. 8 sieve.

c. Coarse Aggregate: ASTM C 404, size No. 8.

2.4.4 Portland Cement

ASTM C150, Type I.

2.4.5 Lime Putty

Slaked according to manufacturer's instructions.

a. Hydrated Lime: SAO 181.

b. Pulverized Quicklime: SAO 181 except 100 percent shall pass the No. 20 sieve and 90 percent shall pass the No. 50 sieve.

c. Lime Paste: Lime paste shall be made with pulverized quicklime or hydrated lime. Hydrated lime processed by the steam method shall be allowed to soak not less than 24 hours. Quicklime and other hydrated lime shall be allowed to soak not less than 72 hours. In lieu of hydrated lime paste for use in mortar, the hydrated lime may be added in the dry form.

2.4.6 Water: Potable.

2.5 Mortar Mixes

2.5.1 Proportions

Type M in accordance with the proportion specifications of ASTM C 270. The mortar shall have a flow, after 11 minutes, of 75 percent or more when tested for water retention in accordance with ASTM C 91 except mortar shall be mixed to an initial flow of 105 to 115 percent.

2.6 Grout Mixtures

2.6.1 Proportions

Mix in laboratory established proportions to in a compressive strength at 28 days of not less than 13.80 MPa (2,000 psi) when tested in accordance with ASTM C 91 for fine aggregate and ASTM C 39 for grout containing coarse aggregate. Grout shall be classified as fine and low lift types as specified below.

a. Fine Grout: Portland cement, fine aggregate, and sufficient water to obtain a pouring consistency without segregation of the constituents. Slump shall be approximately 125 mm.

b. Low Lift Grout: Portland cement, lime paste or hydrated lime, fine aggregate and coarse aggregate, and sufficient water to obtain a pouring consistency without segregation of the constituents. Slump between 200 and 250 mm.

2.7 Source Quality Control

Prior to delivery of masonry units to the site, select by random sampling nine individual whole units from the units proposed for use. Select units free from cracks or other structural defects. Test in accordance with PNS 16.

PART 3 - EXECUTION

3.1 Preparation

3.1.1 Protection

a. Forms and Shores: Where required, construct forms to the shapes, lines, and dimensions of the members indicated. Construct forms sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Do not remove supporting forms or shores until the supported masonry has acquired sufficient strength to support its weight and construction loads to which it may be subjected. In no case shall supporting forms or shores be removed in less than 10 days. Wait at least 16 hours after grouting masonry walls after applying uniform loads and wait an additional 48 hours before applying concentrated loads.

b. Wall Bracing: Brace walls against wind and other forces during construction. Allow sufficient time between lifts to prevent cracking of face shells of hollow masonry units. If blowouts, misalignment, or cracking of face-shells should occur during construction, tear down and rebuild the wall at no additional cost to the Owner.

3.1.2 Surface Preparation

Clean laitance, dust, dirt, oil, organic matter or foreign materials from concrete surface upon which reinforced masonry is to be placed. Use sandblasting, if necessary, to remove laitance

from pores and expose to the aggregate.

3.2 Laying Masonry Units

3.2.1 Wet Masonry Units

Do not wet concrete masonry units. Do not lay units having a film of water on the surface.

3.2.2 Embedded Items

Build in wall plugs, accessories, flashings pipe sleeves and other items required being built-in as the masonry works progresses. Fill cells receiving anchor bolts and cells of the first course below bearing plates with mortar or grout. Fill spaces around metal doorframes and other built-in items with mortar. Point openings around flush-mounted electrical outlet boxes in wet locations, including the flush joint above the box with mortar. Do not embed aluminum items.

3.2.3 Bond Beams and Lintels: Install bond units, reinforced as indicated, filled with grout. Install open bottom type bond beam units over cells to be filled. Place wire mesh or small mesh metal lath under open bond beam units if used over cells not to be filled.

3.2.4 Unfinished Work: Step back-unfinished work for joining with new work. Do not use toothing without the written approval of the Owner's Representative. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

3.2.5 Placing Units: Lay hollow masonry units so as to preserve the vertical continuity of cells filled with grout. The minimum clear horizontal dimensions of vertical cores shall be 50 mm by 75 mm. Masonry bond units at corners. Anchor intersections by reinforcing bars as indicated. Adjust each unit to its final position while mortar is still soft and plastic. If any unit is disturbed after mortar has stiffened, remove and relay in fresh mortar. Keep chases, raked out joints, and spaces to be grouted, free from mortar and other debris.

3.2.6 Bond Pattern: Lay masonry units in running bond.

3.2.7 Cutting and Fitting: Wherever possible, use full units of the proper size in lieu of cut units. Use power masonry saws for cutting and fitting. Concrete -masonry units shall be wet cut. Make cut edges clean, true and sharp. Make openings carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will be aligned at the bottom with the masonry joints. Cut webs of hollow masonry units to the minimum required for proper installation. Provide reinforced masonry lintels, above openings over 300 mm wide for pipes, ducts and cables trays unless steel sleeves are used.

3.2.8 Mortar Joints: Spread bed joints with mortar for the full thickness of the face shells. Where only cells containing reinforcement are to be grouted, spread cross webs around such cell with mortar to prevent leakage of grout. Butter head joints for full thickness of the face shell and place the units. Avoid fins of mortar that protrude into cells to be grouted.

3.2.9 Jointing: Tool joints when the mortar is thumbprint hard. Tool horizontal joints first. Brush joints to remove loose and excess mortar. Mortar joints shall be finished as follows:

a. Flush Joints: Flush cut joints in concealed masonry surfaces and joints above electrical outlet boxes in wet areas. Make flush cut joints by cutting off the mortar flush with the face of the wall.

b. Tooled Joints: Tool joints in exposed exterior and interior masonry surfaces slightly concave. Use a jointer of sufficient length to obtain a straight and true mortar joints.

c. Joint Width: 9 mm wide.

3.3 Placing Reinforcing Steel

Prior to placing grout, clean, reinforcement of loose, flaky rust, scale, grease, mortar, grout, or other coating which might destroy or reduce its bond with the grout. Details of reinforcement shall be in conformance with ACI 315. Do not bend or straighten reinforcing in a manner injurious to the steel. Do not use bars with kinks or bends not shown on the drawings. Placement of reinforcement shall be inspected and approved prior to placing grout.

3.3.1 Positioning Bars: Position vertical bars accurately at the centerline of the wall. Maintain a minimum clearance between the bars and masonry units of 12 mm and between parallel bars of one diameter of the reinforcement. Hold vertical reinforcing in place using metal support, centering clips, spacers, ties or caging devices located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement.

3.3.2 Splices: Locate splices only as indicated. Stagger splices in adjacent bars at least 600 mm. Lap bars a minimum of 40 diameters of the reinforcement or 600 mm, whichever is greater. Welded or mechanical connections shall develop the full strength of the reinforcement.

3.4 Placing Grout

Use a hand bucket, concrete hopper or grout pump. Place grout in final position within 1-½ hours after mixing. Where grouting is discontinued for more than one hour, stop the grout 25-mm below the top of a course to form a key at pour points. Place grout to completely fill the grout spaces without segregation of the aggregates.

3.4.1 Low Lift Grout Method

Place grout as masonry is erected at a rate that will not cause displacement of the masonry due to hydrostatic pressure of the grout. If mortar has been allowed to set prior to grouting, remove fins protruding more than 12 mm into the grout space. Rod or puddle grout during placement using a long 25-mm by 50-mm wood stick or a mechanical vibrator.

3.5 Tolerance

Lay masonry plumb, true to line, with course level. Keep bond patterns plumb throughout.

3.6 Field Quantity Control

3.6.1 Grout

Employ a qualified testing laboratory to proportion and test grout. Do not change laboratory established proportions or use materials with different physical or chemical characteristics in grout for the work unless additional evidence is furnished that the grout meets the specified requirements.

3.7 Cleaning

After mortar joints have attained their initial set but prior to hardening, completely remove mortar and grout daubs or splashing from exposed masonry surfaces. Before completion of the work, make out defects in joints in exposed masonry surfaces fill with mortar and tool to match existing joints. Immediately after grout work is completed remove scum and stains which have percolated through the masonry using a high pressure steam of water and a stiff fiber bristled brush. Do not use metal tools or metal brushes for cleaning. Dry brush exposed concrete masonry unit surfaces at the end of work each day.

3.8 Method Of Measurement

The quantity to be paid for shall be the number of square meters of reinforced concrete masonry completed in place and accepted. Projections extending beyond the faces of the walls shall not be included. In computing the quantity of payment, the dimensions used shall be those shown on the Plans. No deductions shall be made for weepholes, drainpipes or other openings of less than one square meter in area.

3.9 Basis Of Payment

The quantity of masonry, determined as provided in the Methods of Measurement, shall be paid for at the contract unit price per square meter of masonry, which price and payment shall be full compensation for furnishing and placing all materials, including mortar for masonry, for all necessary excavations, and for all labor, equipment, tools and incidentals to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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DIVISION 9 – METAL

SECTION 05120 -STRUCTURAL STEEL

PART 1 - GENERAL

1.1 Applicable Publications

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Unless specified, all publications below shall be of the latest edition.

1.1.1 American Institute of Steel Construction (AISC) Publications:

Manual of Steel Construction, 13TH Edition

Detailing for Steel Construction

Engineering for Steel Construction

1.1.2 American National Standards Institute (ANSI) Publications:

B18.22.1 Plane Washers

1.1.3 American Society for Testing and Materials (ASTM) Publications:

A 36 Structural Steel

A 53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless

A 108 Steel Bars, Carbon, Cold-Finished, Standard Quality

A 307 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

A 325 High-Strength Bolts for Structural Steel Joints

A 370 Mechanical Testing of Steel Products

A 563 Carbon and Alloy Steel Nuts

C 827 Early Volume Change of Cementitious Mixtures

1.1.4 American Welding Society (AWS) Publications

D 1.1 Structural Welding Code, Steel

1.1.5 Steel Structures Painting Council (SSPC) Publications:

SSPC SP1 Surface Preparation Specification No. 1, Solvent Cleaning

SSPC SP3 Surface Preparation Specification No. 3, Power Tool Cleaning.

SSPC SP10-91 Surface Preparation Specification No. 10, Near White Blast

1.2 Description of Work

The work includes the fabrication, erection, and shop painting of structural steel in accordance with the AISC "Manual of Steel Construction" referred to herein. In the AISC "Manual of Steel Construction" referred to herein, the Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings," and the "Code of Standard Practice for Steel Buildings and Bridges", and “structural Joints using A325 or A490 Bolts” shall be considered a part thereto.

1.3 Submittals

1.3.1 Shop Drawings: Submit shop drawings of all structural steel in 5 copies for approval prior to fabrication of structural steel. Include complete information necessary for the fabrication and erection of the component parts of the structure including the location, type and size of all bolts and welds, members sizes and length, camber & connector details, blocks, copes, and cuts. Include all welds by standard welding symbols of the AWS.

1.3.2 Erection Plan: Submit descriptive data to illustrate the structural steel erection procedure including the sequence of erection and temporary shoring and bracing, and written description of the detailed sequence of all welding, including each welding procedure to be performed.

1.3.3 Certificates of Conformance: Submit certificates of conformance for the following:

a. Steel

b. Bolts, Nuts and Washers

c. Welding Electrodes and Rods

d. Shop Painting Materials

e. Nonshrink Grout

1.3.4 Certified Test Reports:

a. Structural Steel: Chemical analysis and tensile strength test required by ASTM A36.

b. High Strength Bolts and Nuts: Chemical analysis, tensile strength and hardness test required by ASTM A325.

c. Anchor Bolts: Chemical Analysis Tensile Strength and Hardness Test required by ASTM A 307.

1.4 Delivery and Storage

Handle, ship, and store material in a manner that will prevent distortion or other damage. Store material in a clean, properly drained location out of contact with the ground. Replace all damaged material with new material or repair damaged material in an approved manner at no additional cost to the owner.

PART 2 - PRODUCTS

2.1 Steel

2.1.1 Structural Steel: Shall conform to ASTM A 36.

2.1.2 Steel Pipe: Shall conform to ASTM A 53, Type E or S, Grade B, ASTM A 501.

2.2 Bolts, Nuts, and Washers

2.2.1 High Strength bolts for structural steel joints shall conform to ASTM A 325.

2.2.2 Anchor bolts shall conform to ASTM A 307.

2.2.3 Nuts: ASTM A 563, Grade A, heavy hex style, except nuts under 38 mm may be provided in hex style or equal.

2.2.3 Washers: ANSI B18.22.1, Type B or equal.

2.3 Accessories

2.3.1 Welding Electrodes and Rods: Steel structural members (built up columns, built up beams, beam to beam, beam to column, and base plate connections, trusses) shall use E70XX electrodes.

2.3.2 Non-shrink Grout: ASTM C 827; non-metallic.

PART 3 - EXECUTION

3.1 Fabrication: Fabricate in accordance with the applicable provisions of the Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings as set forth in Part 5 of the AISC "Manual of Steel Construction".

3.1.1 Welding of Structural Steelwork: Provide AWS D1.1 qualified welders, welding operators and tackers.

3.1.2 Shop Painting: Except as otherwise specified, shop paint surfaces of all structural steel, except steel to be embedded in concrete or mortar and bearing surfaces. Surfaces to be welded shall not be coated within 12 mm from the specified top of the weld prior to welding (except surfaces on which sheer studs are to be welded. Do not apply paint to steel which is at a temperature that will cause blistering or porosity or will otherwise be detrimental to the life of the paint. Apply paint in a workmanlike manner, and coat all joints and crevices thoroughly. Prior to assembly, paint all surfaces which will be concealed or inaccessible after assembly.

a. Cleaning: Wash clean surfaces which become contaminated with rust, dirt, oil, grease or other contaminants with solvents until thoroughly clean. Insure that steel to be embedded in concrete and surfaces when assembled, are free from rust, grease, dirt and other foreign matter.

b. Priming: Shop prime coat surfaces as soon as possible after cleaning. Apply two coats of epoxy red lead primer to a minimum dry film thickness of 2.0 mils.

3.1.3 Field Painting: When the erection work is complete, the heads of field bolts, all welds and any surface from which the shop coat of paint has become worn off or has otherwise become defective, shall be cleaned and thoroughly covered with two coats of shop coat paint. When the paint applied for touching up bolt heads and abraded surfaces has becomethoroughly dry, apply two field coats of finishing paint to a minimum dry film thickness of 2.0mils.

3.1.4 Marking: Prior to erection, members shall be provided with a painted erection mark. In addition, connecting parts assembled in the shop for remaining holes in field connections shall be matched marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations.

3.2 Erection

Except as modified herein, erect steel in accordance with the AISC "Manual of Steel Construction". Where parts cannot be assembled or fitted properly as a result of errors in fabrication or of deformation due to handling or transportation, report such condition immediately to the Owner's Representative and obtain approval therefrom for the methods of correction before proceeding with marking any corrections. Do not heat-treat parts for straightening. Drain steel work properly; fill pockets in structures exposed to the weather with an approved waterproof material. Provide safety belts and lines for workmen aloft on high structures unless safe working platforms or safety nets are provided. When calibrated wrenches are used for tightening bolts, calibrate them at least once each working day using not less than three typical bolts of each diameter. Do not use impact torque wrenches to tighten anchor bolts set in concrete.

3.2.1 Connections: Connections not detailed shall be designed in accordance with AISC “Manual of Steel Construction”. Build connections into existing work. Punch, subpunch and ream, or drill bolt holes.

3.2.2 Base Plates and Bearing Plates: After final positioning of steel members, provide full bearing under plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer’s instructions.

3.2.3 Tolerances: In accordance with the "Code of Standard Practice” of the AISC "Manual of Steel Construction".

3.2.4 Temporary Welds and Run-Off Plates and Backing Strips: Need not be removed.

3.3 Tests and Inspections

3.3.1 Visual Inspection of Welding: After the welding is completed, hand or power wire brush welds, and thoroughly clean them before the inspector makes the check inspection. Inspect welds with magnifiers under strong, adequate light for surface cracking, porosity, and slag inclusions; excessive roughness; unfilled craters; gas pockets; undercuts; overlaps; size and insufficient throat and concavity. Inspect the preparation of groove welds for adequate throat opening and for snug positioning of backup bars.

3.3.2. Nondestructive Testing: AWS D1.1. Twenty five percent of the total number of joints as selected by the Owner's Representative shall be tested. If more than 20 percent of welds contain defects identified by testing, then all welds shall be tested by radiographic or ultrasonic testing, as approved by the Owner's Representative. When all welds made are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

3.4 Method Of Measurement

The quantity of structural metal framing to be paid for shall be the number of kilograms complete in place and accepted.

3.5 Basis Of Payment

The quantities, measured as prescribed in the Method of Measurement, shall be paid for at the contract unit price for the several Pay Items which price and payments shall be full compensation for furnishing, preparing, fabricating, transporting, placing and erecting all structural steel and all other materials for the complete structure; for all shop work, painting and field work; for all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section. Such payment shall constitute full payment for the completed structure ready for use, and no allowance shall be made for cofferdam construction, false

work, or other erection expenses that shall be needed for the correction of misfits and errors in the fabrication.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 05510 - MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 SCOPE

Furnish materials and equipment and perform all work necessary to complete:

All miscellaneous metal work as shown and as hereinafter specified.

The work includes but is not necessarily limited to the following:

Stainless Steel Ladder Rung
Manhole Cover including frame and handle
Anchors
Checkered plate manhole cover
and miscellaneous metals

See drawings for sizes, details and location of work required.

1.2 SUBMITTAL

a. Shop Drawings: Submit detailed shop drawings for approval prior to ordering materials or fabrication. Show complete information concerning fabrication installation, insert location, joint details, fastenings and other information requested by the Engineer. Shop drawings shall be submitted in accordance with the requirements of the General Conditions.

Minor variation in details for the purpose of improving fabrication and installation procedures, but not affecting the exterior design concept or structural stability will be given consideration if submitted.

1.3 MEASUREMENT AND COORDINATIONS

Obtain measurements for all work required to be accurately fitted at the job and not from the drawings. The Contractor will be responsible for the accuracy of all such measurements and the precise fitting and assembly of the finish products. Coordinate the work with that of all other trades to prevent interference. Verify conditions at the job before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

a. Miscellaneous: Miscellaneous materials or accessories not listed above shall be provided as specified hereinafter the various items of work and/or indicated on the drawings, or in accordance with manufacturer's specifications.

PART 3 - EXECUTION

3.1 WORKMANSHIP

a. Make all works well formed to shape and size shown and assemble as detailed.

All items shall be of the materials, design, shape, sizes and thickness shown or called for on the drawings and herein specified. Methods of fabrication and assembly however, unless otherwise specifically stated, shall be of first quality craftsmanship and at the discretion of the Contractors whose responsibility shall be to guarantee satisfactory performance as herein specified.

b. Cut, shear and punch to produce clean, true lines and surfaces with burrs removed.

c. Weld or bolt connections as indicated. Use countersunk screws in recessed work where possible. Make all details of assembly strong with sufficient stiffness. Form joints exposed to weather in a manner to exclude water.

d. Provide all work proper clearances. Fabricate and install in a manner to provide for expansion and contraction but will insure rigidity and provide close fitting of sections.

e. Fabricate and install as directed by the Manufacturer.

f. Provide a protective clear coating which is resistant to alkaline, mortar and plaster to be applied to aluminum sections after fabrication.

3.2 PROTECTION

Protect all finished work until turnover to the Owner.

3.3 METHOD OF MEASUREMENT

The quantity to be paid for shall be the number of set of specified item actually completed and accepted.

3.4 BASIS OF PAYMENT

The quantities determined as provided in Method of Measurement shall be paid for at the contract price per unit of measurement, respectively, for each of the particular Pay Item listed on the Bill of Quantities, which price and payment shall constitute full compensation for furnishing and placing all materials, including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

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SECTION 05520 – HANDRAILS, RAILINGS AND GUARDRAILS

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing of materials and labor including equipment necessary to complete the installation of handrails, railings and guardrails as shown on the drawings and as specified herein.

1.2 SUBMITTAL

1.2.1 Product Data

Manufacturer's technical data for products and processed used in handrails, railing, guardrails system, including finishes and grout.

1.2.2 Shop Drawings

Show details of fabrication and installation for each type and material of handrail, railing, and guardrails required including plans, elevations, sections, profiles of rails, fittings, connections, and anchors.

1.2.3 Samples

Prepare samples of each type of metal handrails & railings stainless steel hairline finish and automotive paint finish as required on GIP metal. Where finish involves normal color and texture variations, include sample sets composed of two or more units showing limits of such variations expected in completed works.

a. Include 6" long samples of each distinctly different railing member including guardrails, handrails, top rails, posts, and balusters. Include samples of fittings and brackets if requested by Architect.

b. Include sample of typical welded connection.

1.3 QUALITY ASSURANCE

1.3.1 Single Source Responsibility

Obtain handrails, guardrail and railing systems of each type and material from a single manufacturer.

1.4 STORAGE

1.4.1 Store handrails, guardrail and railing systems in clean, dry location, away from uncured concrete and masonry, protected against damage of any kind. Cover with waterproof paper, tarpaulin, or polyethylene sheeting; allow for air circulation inside the covering.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General

Comply with standards indicated for forms and types of metals indicated or required for handrail and railing system components.

a. Stair Railings: 50 x 8mm thk GI pipe, or as indicated on plans.

b. Stair Handrail: 50 x 10mm thk pipe, Stainless steel or as indicated on plans.

c. Guardrail: 50mm x 10mm thick stainless steel pipe or as indicated on plans.

d. Steel Railings: refer to plans for the required dimension of various types of stainless steel railings and location.

Stair Tread: 6mm thk bended checkered plate.

Fastenings: commercial types, except where special types are shown or required. Fastenings for all exterior work shall be non-ferrous, unless otherwise shown. Fastenings for steel and aluminum and for all other interior work, where exposed, shall match the fastened metal.

Miscellaneous: miscellaneous materials or accessories not listed above shall be provided as specified hereinafter the various items of work and/or indicated on the drawings, or in accordance with manufacturer's specifications.

2.2 MISCELLANEOUS MATERIALS

a. Non-shrink Nonmetallic Epoxy Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, nongaseous grout complying with CE CRD C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

b. Welding Electrodes as recommended by producer of metal to be welded, complying with applicable AWS Specifications, and as required for color match, strength, and compatibility in fabricated items.

c. Fasteners

Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work, except where otherwise indicated.

2. Provide Philips flat head machine screws for exposed fasteners, unless otherwise indicated.

2.3 FABRICATION

2.3.1 General

Fabricate handrails and railing systems to design, dimensions and details shown. Provide handrail and railing members in sizes and profiles indicated, with supporting posts and brackets or size and spacing shown, but not less than required to comply with requirements indicated for structural performance.

2.3.2 Shop Assembly

Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

2.3.3 Welded Connections

Fabricate handrails, guardrail and railing systems of materials indicated below for interconnections of members of welding. Use welding method, which is appropriate for metal and finish, indicated and develops strength required to comply with structural

performance criteria. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.

2.3.4 Form changes in direction of railing members by bending members by metering, or as indicated on the drawing, as approved by the Architect.

2.3.5 Furnish inserts and other anchorage devices for connecting handrails, guarail and railing systems to concrete or masonry work. Fabricate anchorage devices, which are capable of withstanding loading imposed by handrails, guardrails and railing systems. Coordinate anchorage devices with supporting structure.

a. For railing, and guardrail posts set in concrete provide pre-chiseled openings and insert posts as indicated on drawings. Fill opening with non-shrink, non-metallic grout.

2.4 METAL FINISHES, GENERAL

Comply with NAAMM “Metal Finishes Manual” for recommendations and designations of finishes, except as otherwise indicated.

PART 3 - EXECUTION

3.1 PREPARATION

a. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete and masonry construction. Coordinate delivery of such items to project site.

b. Field Measurements

Take field measurements prior to fabrication.

3.2 INSTALLATION, GENERAL

a. Fit exposed connections accurately together to form tight, hairline joints.

b. Perform cutting, drilling, and fitting required for installation of handrails, guardrail and railing systems. Set work accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels.

c. Field Welding

Comply with applicable AWS specification for procedures of manual shieldedmetal-arc welding, for appearance and quality of welds made, and for methods used in correcting welding work. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed welded joints smooth and restore finish to match finish of adjacent rail surfaces.

d. Prior to anchoring, adjust handrails and railing systems to ensure matching alignment at abutting joints. Space posts at interval indicated but not less than that required by design loading.

3.3 ANCHORING POSTS

a. Concrete-Anchored Posts: Provide chiseled opening on concrete base as indicated on the drawings to receive railing posts and required anchoring system. Clean holes of all loose material, insert posts, and fill annular space between post and concrete with non-shrink, non-metallic epoxy grout, mixed and placed tocomply with grout manufacturer’s directions.

3.4 RAILING CONNECTIONS

a. Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fittings designed for this purpose.

3.5 ANCHORING RAILING ENDS

a. Anchor railing ends to metal surfaces with manufacturer's standard fittings using concealed fasteners, unless otherwise indicated.

b. Anchor Railing Ends to Concrete or Masonry, use drilled-in expansion shields and concealed hanger bolts, unless otherwise indicated.

3.6 PROTECTION

a. Protect finishes of railing, handrails and guardrails system from damage during construction period by use of temporary protective coverings approved by railing manufacturer. Remove protective covering at time of Substantial Completion.

b. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units as required.

3.7 METHOD OF MEASUREMENT

The quantity to be paid for shall be the number of linear meters of specified railing actually completed and accepted.

3.8 BASIS OF PAYMENT

The quantities determined as provided in Method of Measurement shall be paid for at the contract price per unit of measurement, respectively, for each of the particular Pay Item listed below and shown on the Bill of Quantities, which price and payment shall constitute full compensation for furnishing and placing all materials, including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made in accordance with the Bill of Quantities.

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DIVISION 10 – THERMAL AND MOISTURE

SECTION 07102 - ELASTOMERIC WATERPROOFING SYSTEM, FLUID-APPLIED

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing and supply of materials including equipment, and performing labor necessary to complete the installation of fluid applied elastomeric waterproofing system for escalator and elevator pits and as shown on plans and specified herein.

1.2 SUBMITTALS:

Submit the following for approval:

1.2.1 Certificates of Compliance

Manufacturer's certificates of compliance attesting that fluid membrane materials are physically and chemically compatible with each other.

1.2.2 Manufacturer's Data

Includes material description and physical properties, application details, and recommendations regarding shelf life, application procedures, and precautions on flammability and toxicity. Submit for:

a. Fluid-applied membrane component, including primers

b. Elastomeric sheets

c. Cleaner, activating solvent

1.2.3 Samples

Submit mock-up samples for each waterproofing type.

1.3 DELIVERY AND STORAGE

Deliver manufactured waterproofing materials in manufacturer's original, unopened containers, with labels intact and legible. Containers of materials covered by referenced specification number shall bear the specification number, type, and class of the contents. Store and protect materials in accordance with the manufacturer's instructions, and use within their indicated shelf life. Promptly remove from the site materials or incomplete work adversely affected by exposure to moisture. Use pallets and canvas tarpaulins to cover stored materials top to bottom.

1.4 ENVIRONMENTAL CONDITIONS

Apply materials when there is no surface moisture, or visible dampness on the substrate surface. Ensure the air temperature remains above the temperature recommended by the manufacturer. Moisture test for substrate is specified under Item 3.4, "Field Tests". Work may be performed within heated enclosures, provided the surface temperature of the substrate is maintained at a minimum temperature recommended by the manufacturer, for 24 hours prior to the application of the waterproofing, and remains above that the temperature during the cure period recommended by the manufacturer.

1.5 WATERPROOFING CONFERENCE

Prior to starting application of the waterproofing system arrange a pre-waterproofing

conference to ensure a clear understanding of drawings and specifications. Give the Owner 7 days advance written notice of the time and place of meeting. The contractor, mechanical and electrical sub-contractor, flashing sheets metal sub-contractor, and other trades that may do other types of work on or over the membrane after installation shall attend this conference.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED MEMBRANE ASTM C 836

2.1.1 Membrane Primer

Primers, unless specifically prohibited by the manufacturer of the fluid-applied membrane, are required and shall be as recommended by the fluid-applied membrane.

2.2 SEALANT

As specified in Section 07900, “Sealant and Caulking”.

2.3 SEALANT PRIMER

As specified in Section 07900, “Sealant and Caulking”

2.4 JOINT FILLER

Joint filler shall conform to ASTM D1751 or D1752.

2.5 BOND BREAKER

Bond breaker shall be as recommended by the manufacturer of the fluid-applied membrane. The bond breaker shall not interfere with the curing process or other performance properties of the fluid-applied membrane.

2.6 ELASTOMERIC SHEET

Elastomeric sheet shall be preformed sheet as recommended by the fluid-applied membrane manufacturer. The bond strength between the fluid-applied membrane and the preformed elastomeric sheet shall be not less than 6.9 MPa when tested in accordance with ASTM C836.

2.7 ELASTOMERIC SHEET ADHESIVE

Elastomeric sheet adhesive shall be as recommended by the elastomeric sheet manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

Coordinate the work with that of other trades to assure that components to be incorporated into the waterproofing system are available when needed. Inspect and approve surfaces immediately before the application of the waterproofing materials. Free concrete surfaces of laitance, loose aggregate, sharp projections, grease, oil, dirt, curing compounds, and other contaminants that could adversely affect the complete bonding of the fluid-applied membrane to the concrete surface.

3.1.1 Flashings

Do not begin application until penetrations through the structural slab are in place, and until

sleeves are placed through the slab and are made watertight.

3.1.1.1 Drains

Drain flanges shall be flush with the surface of the structural slab. Apply a full elastomeric sheet around the drain, with edges fully adhered to the drain flange and to the structural slab. Do not adhere the elastomeric sheet over the joint between the drain and the concrete slab. Take care not to plug any drainage of weep holes. Cover the elastomeric sheet with fluid-applied waterproofing during waterproofing application. The elastomeric sheet shall be adhered a minimum of 100 mm (4”) into the horizontal deck. Cover this portion of the elastomeric during waterproofing application.

3.1.1.2 Other Penetration and Projections

Flash penetrations and projections, including vents and service pipes, through the structural slab with an elastomeric sheet adhered to the concrete slab and the penetration. Leave the elastomeric sheet unadhered for 25 mm (1”) over the joint between the penetration and the concrete slab. The elastomeric sheet shall be adhered a minimum of 100 mm (4”) onto the horizontal deck. Cover the elastomeric sheet with fluid-applied waterproofing during the waterproofing application.

3.1.1.3 Walls and Vertical Surfaces

Flash wall intersections which are not of monolithic pour or constructed with reinforced concrete joints with an elastomeric sheet adhered to both the vertical wall surface and the concrete slab. Intersections that are monolithic pour or constructed with reinforced concrete joints with an elastomeric sheet adhered to both the vertical wall surface and the concrete slab can be flashed with a vertical grade of fluid-applied waterproofing membrane. Leave the sheet unadhered for a distance of 300 mm (12”) from the corner on both the vertical and horizontal surfaces. Cover the elastomeric sheet with fluid-applied waterproofing during waterproofing application.

3.1.2 Cracks and Joints

Prepare visible cracks and joints in the substrate to receive application of the waterproofing membrane by separating these joints from the waterproofing membrane by placing bond breaker and an elastomeric slip between the membrane and the substrate. Cracks that show movement shall receive a 50 mm (2”) bond breaker followed by an elastomeric sheet adhered to the deck. Nonmoving cracks shall be double coated with the fluid-applied waterproofing.

3.1.3 Priming

Prime surfaces to receive the fluid-applied waterproofing membrane. Apply the primer as required by the membrane manufacturer’s printed instructions.

3.2 SPECIAL PRECAUTIONS

Protect components during transport and application of waterproofing materials. Do not dilute primers and other materials, unless specifically recommended by the materials manufacturer. Keep containers closed except when removing the contents. Do not allow contact of various materials through mixing of remains and dual use of application equipment for mixing and transporting materials. Do not permit equipment on the project site that has residue of materials on previous projects. Use cleaners for cleaning, not for thinning primers of membrane materials. Ensure that workers and other who walk on the cured membrane wear clean, soft-soled shoes to avoid damaging the waterproofing materials.

3.3 APPLICATION

Over the primed surfaces, provide a uniform, monolithic coating of fluid-applied membrane, 60 mils thick, plus or minus 5 mils thick, by following the manufacturer's printed instructions. Apply material by trowel, squeegee, roller, brush, spray apparatus, or other method acceptable to the membrane manufacturer. Check wet film thickness as specified under Item 3.4, "Field Tests", and adjust application rate as necessary to provide a uniform coating of the thickness specified. Where possible, mark off the surface to be coated in even units to facilitate proper coverage. At expansion joints, control joints, prepared cracks, and termination, carry the membrane over the preformed elastomeric sheet in a uniform 60 mils thick, plus or minus 5 mils, wet thickness to provide a monolithic coating. When work has stopped long enough for the membrane to cure, begin the next application by wiping the previously applied materials with a solvent so that accumulated dirt and dust, which could inhibit adhesion of the overlapping membrane coat, is removed. Use solvent recommended by the membrane manufacturer, as approved.

3.3.1 Work Sequence

Perform the work so that protection board is installed prior to using the waterproofed surface. Do not permanently install protection board until the membrane has passed the flood test specified under Item 3.4, "Field Tests". Move material storage areas as work progresses to prevent abuse of the membrane and overloading the structural deck.

3.3.2 Protection Board

Protect the fluid-applied membrane by placing protection board over the membrane. Timing of placement shall fall within the parameters established by the fluid-applied membrane manufacturer. Protect membrane application if the protection board is not placed immediately. Butt protection boards together and do not overlap.

3.4 FIELD TESTS

3.4.1 Moisture Test

Prior to application of the waterproofing, check moisture content of substrate with moisture meter. An acceptable device is the Delmhorst Moisture Meter, Model BD7/2E/CS, Type 21 E. Similar meters by other manufacturers, which are suitable for the purpose, may be used as approved. Do not begin application until the meter reading indicates "dry" range or similar reading indicating that substrate is suitably dry.

3.4.2 Film Thickness

Check wet film thickness every 10 square meters during application by placing flat metal plates on the substrate or using a mil-thickness gauge especially manufactured for the purpose.

3.4.3 Flood Test

After application and curing is complete, plug drains and fill the waterproofed area with water to a depth of 50 mm (2"). A minimum 48-hour cure time shall be required prior to flood testing in order to ensure full cure of the membrane and adhesive prior to subjecting them to full flood test of water. Allow water to stand 24 hours. Test water tightness by carefully measuring the water level at the beginning and end of the 24-hour period. In the event that the water level falls drain the water, allow the installation to dry, and inspect. Make repairs or replace as required and repeat the test. Work shall not proceed before approval of repairs of replacement.

3.5 AREAS OF APPLICATION

a. 5 Ply Elastomeric Membrane Waterproofing or approved equal, buried type waterproofing.

3.6 METHOD OF MEASUREMENT

Elastomeric waterproofing shall be measured by actual area in square meter installed and accepted.

3.7 BASIS OF PAYMENT

The quantity measured as provided in Method of Measurement shall be paid for at the contract unit price for Elastomeric Waterproofing which price and payment shall constitute full compensation for furnishing and placing all materials, including labor, equipment, tools and incidentals, necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 07103 - ELASTOMERIC ACRYLIC WATERPROOFING SYSTEM

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing and supply of materials including equipment, and performing labor necessary to complete the installation of elastomeric acrylic waterproofing system applied as coating for roof, as shown on plans and specified herein.

1.2 SUBMITTALS:

Submit the following for approval:

1.2.1 Manufacturer's Data

Includes material description and physical properties, application details, and recommendations regarding shelf life, application procedures, and precautions on flammability and toxicity.

1.2.3 Samples

Submit mock-up samples for each waterproofing type.

1.3 DELIVERY AND STORAGE

Deliver manufactured waterproofing materials in manufacturer's original, unopened containers, with labels intact and legible. Containers of materials covered by referenced specification number shall bear the specification number, type, and class of the contents. Store and protect materials in accordance with the manufacturer's instructions, and use within their indicated shelf life. Promptly remove from the site materials or incomplete work adversely affected by exposure to moisture. Use pallets and canvas tarpaulins to cover stored materials top to bottom.

1.4 ENVIRONMENTAL CONDITIONS

Apply materials when there is no surface moisture, or visible dampness on the substrate surface. Ensure the air temperature remains above the temperature recommended by the manufacturer. Moisture test for substrate is specified under Item 3.4, "Field Tests". Work may be performed within heated enclosures, provided the surface temperature of the substrate is maintained at a minimum temperature recommended by the manufacturer, for 24 hours prior to the application of the waterproofing, and remains above that the temperature during the cure period recommended by the manufacturer.

1.5 WATERPROOFING CONFERENCE

Prior to starting application of the waterproofing system arrange a pre-waterproofing conference to ensure a clear understanding of drawings and specifications. Give the Owner 7 days advance written notice of the time and place of meeting. The contractor, mechanical and electrical sub-contractor, flashing sheets metal sub-contractor, and other trades that may do other types of work on or over the membrane after installation shall attend this conference.

PART 2 - PRODUCTS

2.1 ELASTOMERIC ACRYLIC WATERPROOFING

This waterproofing is made of water-based acrylic resin system which is filled with minute heat shield cells which act as a thermally resistant blanket covering the whole treated

structure. When applied, the Ultraviolet and heat rays are reflected and emitted from the surface, reducing the thermal conductivity between the substrate and the coating. Hence, roof surfaces treated with elastomeric acrylic membrane can experience interior temperature reduction up to 10 degree Celsius. This roof coat also has excellent dirt pick-up resistance and is able to retain elasticity even after aging.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

All surfaces must be clean & free from laitance, dust, dirt, oil & grease. Surfaces should be power washed prior to coating without damaging the roof or cause leaks. Clean the area & apply primer to the unpainted surfaces. Let the primer dry thoroughly before applying the color coat. For painted surfaces, it is required to remove all flakes paints & apply one coat of primer.

3.2 Application

Elastomeric acrylic membrane can be applied by roller, brush or airless spray & should be applied on touch dry between coats.

a. For roller, use a roller to larger areas & use the largest one that fits in the areas to be covered.

b. For brush, use on small or narrow areas & cross brush 3 coats or as per manufacturer's instruction for adequate protection.

c. For airless spray, tip orifice: 0.031"/ atomizing pressure: 2200-2500 psi. For Pump : 3 liters per minute at 2500 psi prime pump with water before using elastomeric acrylic membrane coating. Filter: Remove filters & screens.

d. Cleaning Equipment

Clean equipment with soapy water followed by rinsing with clean water. Flush mineral spirits through spray equipment to prevent rust.

e. Curing

Curing shall be 45 minutes.

3.3 METHOD OF MEASUREMENT

Elastomeric acrylic waterproofing shall be measured by actual area in square meter installed and accepted.

3.4 BASIS OF PAYMENT

The quantity measured as provided in Method of Measurement shall be paid for at the contract unit price for Elastomeric Acrylic Waterproofing which price and payment shall constitute full compensation for furnishing and placing all materials, including labor, equipment, tools and incidentals, necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 07150 - POLYURETHANE BASED APPLIED WATERPROOFING SYSTEM

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing and supply of materials including equipment, and performing labor necessary to complete the installation of polyurethane based applied waterproofing system for canopy, suspended slab deck, toilets and as shown on plans and specified herein.

1.2 SUBMITTALS:

Submit the following for approval:

1.2.1 Manufacturer's Data

Includes material description and physical properties, application details, and recommendations regarding shelf life, application procedures, and precautions on flammability and toxicity.

1.2.3 Samples

Submit mock-up samples for each waterproofing type.

1.3 DELIVERY AND STORAGE

Deliver manufactured waterproofing materials in manufacturer's original, unopened containers, with labels intact and legible. Containers of materials covered by referenced specification number shall bear the specification number, type, and class of the contents. Store and protect materials in accordance with the manufacturer's instructions, and use within their indicated shelf life. Promptly remove from the site materials or incomplete work adversely affected by exposure to moisture. Use pallets and canvas tarpaulins to cover stored materials top to bottom.

1.4 ENVIRONMENTAL CONDITIONS

Apply materials when there is no surface moisture, or visible dampness on the substrate surface. Ensure the air temperature remains above the temperature recommended by the manufacturer. Moisture test for substrate is specified under Item 3.4, "Field Tests". Work may be performed within heated enclosures, provided the surface temperature of the substrate is maintained at a minimum temperature recommended by the manufacturer, for 24 hours prior to the application of the waterproofing, and remains above that the temperature during the cure period recommended by the manufacturer.

1.5 WATERPROOFING CONFERENCE

Prior to starting application of the waterproofing system arrange a pre-waterproofing conference to ensure a clear understanding of drawings and specifications. Give the Owner 7 days advance written notice of the time and place of meeting.

PART 2 - PRODUCTS

2.1 Exposed Type Trafficable Polyurethane Waterproofing

The polyurethane based liquid applied waterproofing is a single component, ready to use, highly elastic, cold applied polyurethane waterproofing which cures into a membrane with excellent abrasion, mechanical, chemical, thermal, and UV resistance.

2.2 Bitumen Modified Polyurethane Liquid Membrane

Liquid Applied Polyurethane waterproofing shall be one part coal-tar-free bitumen modified, moisture curing polyurethane coating. After curing it provides tough highly elastomeric membrane, impervious barrier to moisture.

PART 3 - EXECUTION

3.1 EXPOSED TYPE TRAFFICABLE POLYURETHANE WATERPROOFING

3.1.1 Surface Preparation

Substrate moisture should not exceed 5% (use moisture meter or polyethylene test in accordance with ASTM D 4263). New concrete structures need to dry until the required strength is acquired.

The substrate must be clean and free from all traces of loose materials, old coatings, curing compounds, release agents, laitance, and oil grease. It should be saturated surface dry (SSD) condition.

Structurally unsound layers or surface contaminants must be mechanically removed by abrasive blast tracking, shot blasting, scarifying, or grinding. Substrates heavily impregnated with oil must be cleaned by torching, using suitable solvent or degreaser substance.

Weak concrete must be removed and surface defects such as blow holes and voids must be fully exposed.

All ducts, loose and friable material must be completely removed from all surfaces before application of product, preferably brush and/or vacuum.

3.1.2 For new Construction: (exposed-type roof deck application)

a. For a well prepared and mechanically sound concrete slab, apply waterproofing screed to attain desired slope-to-drain surface level.

b. Anticipate cold joints during Screed pouring. With these joints, create a V-cut profile using concrete grinder or router with the size of approximately 2 inches on both edge diagonally.

c. Apply polyurethane sealant to fill completely the V-cut profile, about 1.5 inches in depth. Once the sealant is cured, create a strip of 25 wet mils waterproofing, 3 inches on each side.

3.1.3 For pipe vent or penetration:

a. Seal the gap between pipe and slab using polyurethane sealant for about 2 inches in diameter.

b. Apply a strip of 25 wet mils waterproofing, 3 inches each side of the sealant around the pipe.

3.1.4 For flashing and wall application:

Apply polyurethane sealant with approximate 20mm width and 20mm height in all corners where the floor meets the wall.

After the sealant has cured, create a strip of 25 wet mils waterproofing measuring 3 inches

on each side.

3.1.5 Priming

For porous substrates like concrete, cement mortar, or wood, use primer, then apply waterproofing within 2-3 hours (not later than 4 hours) when the primer is still a little bit tacky.

For non-porous substrates like metals, ceramic tiles, use primer, then apply waterproofing within 6-12 hours (not later than 24 hours) when the primer is still a little bit tacky.

3.1.6 Mixing

Stir the material well by means of an electric stirrer (approx. 500 rpm). Mixing time at least 2-3 minutes until homogenous mixture is achieved.

3.1.7 Application

a. After application of appropriate primer and observing its curing time, using brush or roller consistently cover the whole area with waterproofing coating system as per manufacturer's recommendation.

b. Second coat has to be applied within 18 hours (not later than 48 hours), ifnecessary.

c. Ensure that the waterproofing coating layers overlap by at least 3 inches beyond previously applied detailing strip.

3.2 BITUMEN MODIFIED POLYURETHANE LIQUID MEMBRANE

3.2.1 Surface Preparation

To ensure optimum results, the surface must be clean, dry and structurally sound, free from contaminants, including but not limited to dust, dirt, loose particles, rust, and oil before application of waterproofing. New concrete must have cured for 28 days.

3.2.2 Application

a. Liquid Applied Polyurethane (PU) Waterproofing can be applied by brush, roller or squeegee.

b. Seal all cracks or joints of up to 20 mm in width with polyurethane sealant before the application of liquid applied waterproofing.

c. Waterproofing can be applied immediately over the polyurethane sealant and seal after initial set of approximately 60 minutes at 25ºC.

d. Waterproofing shall be applied to achieve a dry film thickness between 1.0 to 1.2 mm minimum for optimum performance. To achieve this dry film thickness apply waterproofing at 1.2m/liter/coat. Extremely porous surfaces should be filled prior to coating and a second coat of waterproofing shall be applied.

e. Apply waterproofing evenly to avoid thin spots, air entrapment or pin holes. Any defects can be repaired by over coating and a second cost of waterproofing may be applied as needed.

f. For applications where two coats of waterproofing are required, allow 24 hours between coats. Protection board must be used to protect the membrane before back

filling or concreting. If applied waterproofing is damaged, it can be repaired by cleaning the surface and recoating with the said type of waterproofing.

3.3 METHOD OF MEASUREMENT

Polyurethane based waterproofing system shall be measured by actual area in square meter applied and accepted.

3.4 BASIS OF PAYMENT

The quantity measured as provided in Method of Measurement shall be paid for at the contract unit price for the polyurethane based waterproofing system which price and payment shall constitute full compensation for furnishing and placing all materials, including labor, equipment, tools and incidentals, necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 07160 – CEMENTITIOUS WATERPROOFING SYSTEM

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing and supply of materials including equipment, and performing labor necessary to complete the application of cementitious waterproofing system as shown on plans and specified herein.

1.2 SUBMITTALS:

Submit the following for approval:

1.2.1 Manufacturer's Instruction

Submit to the Engineer the manufacturer's complete printed instructions for the application of the material.

1.2.2 Samples

Submit mock-up samples for each waterproofing type.

1.3 DELIVERY AND STORAGE

Deliver manufactured waterproofing materials in manufacturer’s original, unopened containers, with labels intact and legible. Containers of materials covered by referenced specification number shall bear the specification number, type, and class of the contents. Store and protect materials in accordance with the manufacturer’s instructions, and use within their indicated shelf life. Promptly remove from the site materials or incomplete work adversely affected by exposure to moisture. Use pallets and canvas tarpaulins to cover stored materials top to bottom.

1.4 ENVIRONMENTAL CONDITIONS

Apply materials when there is no surface moisture, or visible dampness on the substrate surface. Ensure the air temperature remains above the temperature recommended by the manufacturer. Moisture test for substrate is specified under Item 3.4, “Field Tests”. Work may be performed within heated enclosures, provided the surface temperature of the substrate is maintained at a minimum temperature recommended by the manufacturer, for 24 hours prior to the application of the waterproofing, and remains above that the temperature during the cure period recommended by the manufacturer.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS WATERPROOFING

Cementitious waterproofing material is a special formulated acrylic polymer designed for compounding with Portland cement. The resulting mixture possesses excellent adhesion, water resistance and flexibility even on thin section. It has also excellent sunlight exposure resistance.

When mixed with cement, the waterproofing material forms a seamless, non-porous impenetrable layer that disperses any liquid upon contact, preventing any seepage when applied on both vertical and horizontal surfaces.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

New masonry surfaces should be allowed to cure at least 14 to 28 days. Surface should be clean, free from oil, grease, dirt, and loose grit or mortar. Wet masonry surfaces first with water before applying the mixture to avoid abrupt drying and cracking of the applied modified cement, under hot and sunny condition.

3.2 APPLICATION

a. Add cement to the waterproofing material slowly while stirring to prevent lumping. Pass mixture through a fine strainer to sift out lumpy materials. Ensure intimate mixing, stirring as often as possible to avoid settling. Keep mixture proportion constant for a uniform texture. Mix enough material to prevent waste. Workability of the waterproofing mixture is 30 minutes, while potlife is 2 hours.

b. For vertical surface such as firewalls, apply 2 coats of the mixture by textured roller or 3 coats by brush.

c. For mortar patching, apply the waterproofing mixture using applicable trowels.

d. For maximum durability, topcoat application is recommended. Allow the waterproofing material to dry at least one day before paint application.

3.3 METHOD OF MEASUREMENT

Cementitous waterproofing shall be measured by actual area in square meter installed and accepted.

3.4 BASIS OF PAYMENT

The quantity measured as provided in Method of Measurement shall be paid for at the contract unit price for Cementitious Waterproofing which price and payment shall constitute full compensation for furnishing and placing all materials, including labor, equipment, tools and incidentals, necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

SECTION 07410 - PREPAINTED HORIZONTAL ROOFING SHEET

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing and supply of materials including equipment, and performing labor necessary to complete the installation of all prepainted horizontal roofing sheet as shown on drawings and as specified herein. The works shall include flashings, trims, accessories and other supplementary materials required for a complete watertight and weather-tight installation.

1.2 SUBMITTALS:

1.2.1 Descriptive Data

Submit descriptive data on materials to be provided. Data shall be sufficient to indicate conformance to specified requirements.

1.2.2 Shop Drawings

Submit shop drawings showing erection and installation details, indicating type, elevations, gauges, fastening and anchoring systems, and other construction details for the following:

a. Roof

b. Flashings and Trims

c. Joint sealing

d. Fastener layouts and sizes

e. Corners

f. Supports

g. Anchorage

h. Closure and special details

1.2.3 Manufacturer's Certificates of Conformance

Submit certificates for all materials to be provided under this section.

1.2.4 Color Sample

Submit two (2) samples of each color indicated or specified.

1.3 DELIVERY AND STORAGE

Deliver, store, and handle panels and other manufactured products to prevent damage. Stack materials stored on the site on platform or pallets and cover with tarpaulins or other suitable weather-tight covering. Store panels so that water, which might have accumulated during transit or storage, will drain off; do not store the panels in contact with materials that might cause staining. Inspect the panels upon arrival to the job site; if wet, remove the moisture and restack and protect the panels until used.

1.4 FACTORY TESTS

The manufacturer shall have conducted tests on previously manufactured sheets of the same type and finish as proposed for the project to assure conformance with quality requirements.

1.5 GUARANTEE

Submit a five (5) year paint warranty that the finished paint coating shall be free of defects, fading color, cracking, flaking or any failure of color finish quality.

PART 2 - PRODUCTS

2.1 GALVANIZED PRE-PAINTED HORIZONTAL ROOFING SHEETS

The prepainted horizontal roofing sheet, shall be 6mm thick x 305mm galvanized cold rolled steel-complying to JIS G 3141 SPCC coated with the eutectic mixture of zinc and aluminum (95/5), complying to ISO 14788, commercial quality.

PART 3 – EXECUTION

3.1 ROOF FRAMING

Roof frames should be well-anchored. Rafters and trusses should be straight, level and parallel to each other. Regular spacing between rafters and trusses should be based on 0.6mm metal thickness and profile of roof to be installed as per manufacturer's recommendation. Provide top grid along ridge line and bridging at mid-span between rafters parallel to top grid.

Double rafters should be provided with 0.10 meter (4 in.) clear space between rafters along valley gutter line. Gutters should be installed before any roofing is laid. Insufficient roof framing anchorage brings about the danger of wind and storm pressure lifting off the whole roof including the roof framing system.

3.2 ROOF CARE DURING INSTALLATION

If possible, carry out all panel cutting on a flat surface. Use a straight edge as a guide and mark off the length where the cut is to be made. Roof panels must be free from concreting works cement, water-proofing compounds, chemical solutions, paint, welding sparks, nails, or iron tools. Removal or scraping of such may cause damage to the roof panels.

Scaffoldings should have protective caps on the points of contact with the roof and should be rested with care on roof edges, gutters and end-flushing to prevent dents and scratches. Roof traffic should be minimized. When crossing the roof area, walking should be conducted along roof frame locations, along overlaps or on wooden planks laid over the roof panels. Walking on the ridges or valleys between the purlins may dent the roofing.

3.3 PAINT COATING SYSTEM

Standard Coating shall be factory applied. The paint is oil free polyester, over baked to achieve full curing to satisfy the requirements of both PNS and JIS Standards. Coating shall have a top coat of 15-18 microns for exterior surfaces. Primer and service coat with 5-7 microns. Exterior color as selected and approved by the Owner and Architect/Engineer.

3.4 CLEANING UP

Pick up all discarded scrap materials, especially ferrous metals such as nails and wires. Immediately wash all plastering site with water. Clean all gutters of leaves and other waste refuse to prevent clogging at downspout areas and allow the continuous flow of water.

To attain its original bright luster finish, wipe the panel with a wet rag and follow up with a clean rag.

3.5 STORAGE REMINDER

Panels should be stacked neatly in a dry and covered areas to prevent capilliary action which could cause rainwater or condensation to be drawn between the sheets. If it is necessary to store the panels in the open, cover completely with loose tarpaulin or similar material and stack with one end slightly elevated. Remember that permanent damage may result if the panels remain wet and clustered together for a long period of time.

3.6 METHOD OF MEASUREMENT

The galvanized pre-painted horizontal roofing sheets shall be measured by the number of square meters installed and accepted.

3.7 BASIS OF PAYMENT

The quantity measured as provided above shall be paid for at the contract unit price for galvanized pre-painted horizontal roofing sheets, which price and payment shall be full compensation for furnishing and placing all materials including roof insulation, sheet metal accessories and gutter, and all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 07412 - ROOF INSULATION

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing of materials including equipment and performing labor necessary to complete the installation of interior roof insulation as shown on drawings and as specified herein.

1.2 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.2.1 American Society for Testing and Materials (ASTM) Publications:

D4397-84 Polyethylene Sheet for Construction, Industrial and Agricultural Applications.E84-

84 Surface Burning Characteristics of Building Materials

1.3 SUBMITTALS

1.3.1 Manufacturer's Instruction

Submit manufacturer's complete printed instructions for the installation of materials.

1.3.2 Samples

Submit samples of materials to be used and secure approval prior to installation.

1.4 DELIVERY AND STORAGE

Deliver materials to the site in the original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect materials from damage. Do not allow insulation materials to become wet or soiled. Comply with manufacturer's recommendation for handling, storage, and protection during insulation.

PART 2 - PRODUCTS

2.1 MATERIAL

The roof insulation shall be double bubble/double foil with minimum thickness of 7.5mm and R value = 19. It consists of air bubble pockets made of high density polyethylene, thermally bonded and sandwiched by layer of pure aluminum foil. Provide chicken wire mesh prior to the laying of bubble insulation. Provide chicken wire mesh prior to the laying of bubble insulation.

PART 3 – EXECUTION

3.1 INSTALLATION

a. Before installing insulation, ensure that the areas that will be in contact with the insulation are dry and free of projections which could cause voids, compressed insulation. If moisture or other conditions are found that do not allow the workmanlike

installation of the insulation, do not proceed but notify the Engineer of such conditions.

b. Keep material dry and free of extraneous materials. Ensure personal protective clothing and respiratory equipment is used. As required observe safe work practices.

c. Install insulation material according to the direction and procedure of the manufacturer.

3.2 METHOD OF MEASUREMENT

The Blanket insulation shall be measured by actual area in square meters installed and accepted.

3.3 BASIS OF PAYMENT

The quantity measured as provided in Method of Measurement shall be paid for at the contract unit price for roof insulation which price and payment shall constitute full compensation for furnishing and placing all materials, including labor, equipment, tools and incidentals, necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 07900 - SEALANTS AND CAULKING

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing and supply of materials including equipment and performing labor necessary to complete installation of all sealants and caulking work as shown on drawings and specified herein.

1.2 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.2.1 American Society for Testing and Materials (ASTM) Publications:

C 834-76 (Rev.86) Latex Sealing Compounds

C 920-86 Elastomeric Joint Sealants

1.3 SUBMITTALS

1.3.1 Certificates of Conformance

Submit certificates from the manufacturers attesting that materials meet the specified requirements.

1.3.2 Manufacturers' Data

Clearly mark data to identify material type provided. Submit complete descriptive data for:

a. Sealants

Data for sealant and caulking shall include application instructions and precautions, self life, mixing instructions for multi-component sealants and recommended cleaning solvent. Silicone sealant should not be used in all the buildings.

b. Primers

c. Backstop Materials

1.3.3 Colors

Submit one sample of each color for each sealant type to verify that products match the colors indicated. Where colors are not indicated, submit not less than 3 different samples of manufacturer's standard colors.

1.3.4 Manufacturer's Test Report

Indicate sealant compatibility with commonly used substrates.

1.4 SAMPLE JOINTS

Before sealant work is started, provide a sample of each type of finished joint where directed. Sample shall show the workmanship, bond, and color of sealant. The workmanship, bond, and color of sealant work throughout the project shall match the approved sample joints.

1.5 ENVIRONMENTAL CONDITIONS

The ambient temperature shall be within the limits of 40 and 100 degrees F when the sealant is applied.

1.6 DELIVERY AND STORAGE

Deliver materials to the job site in unopened manufacturer's external shipping containers, unopened, with brand names, date of manufacture and material designation clearly marked thereon. Elastomeric sealant containers shall be labeled as to type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 37.8 degrees or less than 4.5 degrees C.

PART 2 - PRODUCTS

2.1 MATERIALS

Products shall conform to the reference documents listed for each use. Provide sealant that has been tested and found suitable for the substrates to which it will be applied.

2.1.1 Interior Sealant: ASTM C 834, Type S or M, Grade NS, Class 12.5, Use NT. Locations and colors of sealant shall be as follows:

	Location	**Color**
a.	Small voids between walls or partitions and adjacent lockers, casework, shelving, door frames, built-in or surface-mounted equipment and fixture, and similar items.	As selected
b.	Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.	As selected
c.	Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.	As selected
d.	Joints between edge members for acoustical tile and adjoining vertical surfaces.	As selected
e.	Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.	As selected

2.1.2 Exterior Sealant

For joints in vertical surfaces, provide ASTM C 920, Type S or M, Grade NS, Class 25, Use NT.

For joints in horizontal surfaces, provide ASTM C 920, Type S or M, Grade P, Class 25, Use T.

Locations and colors of sealant shall be as follows:

	Location	**Color**
a.	Joints and recesses formed where frames and	Match adjacent

	subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.	surface color
b.	Masonry Joint where shelf angles occur.	Match adjacent surface color
c.	Expansion and control joints	Match adjacent surface color
d.	Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.	Match adjacent surface color
e.	Voids where items pass through exterior walls	Match adjacent surface color
f.	Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.	Match adjacent surface color
g.	Metal-to-metal joints where sealant is indicated or specified.	Match adjacent surface color
h.	Joints between ends of facias, copings, and adjacent walls.	Match adjacent surface color

2.1.3 Floor Joint Sealant

Floor joint sealant shall conform to ASTM C 920, Type S or M, Grade P, Class 25, Use T. Locations and colors of sealant shall be as follows:

	Location	**Color**
a.	Seats of metal thresholds for exterior doors.	Match adjacent surface color
b.	Control and expansion joints in floors, slabs, ceramic tile, and walkways.	Match adjacent surface color

2.2 FIRE RATED SEALANT

Fire rated sealant shall be one part in tumescent elastomer. Under normal environment conditions the material shall be non-corrosive to metal.

2.3 PRIMER FOR SEALANT

Provide a non-staining, quick-drying type of consistency recommended by the sealant manufacturer for the particular application.

2.4 BOND BREAKERS

Provide the type and consistency recommended by the sealant manufacturer for the particular application.

2.5 BACKSTOPS

Provide glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Backstop material shall be compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

2.6 CLEANING SOLVENTS

Provide types recommended by the sealant manufacturer except for aluminum and bronze surfaces that will be in contact with sealant.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

Surfaces shall be clean, dry to the touch, and free from dirt, frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant.

3.1.1 Steel Surfaces

Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue free solvent.

3.1.2 Aluminum Surfaces

Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use non-staining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

3.2 SEALANT PREPARATION

Do not add liquids, solvents, or powders to the sealant. Mix multi-component elastomeric sealants in accordance with manufacturer's instructions.

3.3 APPLICATION

3.3.1 Joint Width-To-Depth Ratios

a. Acceptable Ratios

JOINT WIDTH	JOINT DEPTH	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
6 mm (minimum)	6 mm	6 mm
Over 6 mm	12 mm width	Equal to width
For wood, concrete, masonry, stone:		
6 mm (minimum)	6 mm	6 mm
Over 6 mm	6 mm	Equal to width
Over 12 mm to 50 mm	12 mm	16 mm
Over 50 mm	(As recommended by sealant manufacturer)	

b. Unacceptable Ratios

Where joints of acceptable width-to- depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding shall not be required on metal surfaces.

3.3.2 Backstops

Install backstops dry and free of tears or holes. Tightly pack the back or bottom with backstop material to provide a joint of the depth specified. Install backstops in the following locations:

a. Where indicated

b. Where backstops are not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios."

3.3.3 Primer

Immediately prior to application of the sealant, clean out all loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.

3.3.4 Bond Breaker

Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

3.3.5 Sealants

Provide a sealant compatible with the materials to which it is applied. Do not use a sealant that has exceeded shelf life or has become too jelled to be discharge in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Sealant shall be uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joint, apply sealant, and tool smooth as specified.

3.4 PROTECTION AND CLEANING

3.4.1 Protection

Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if remove 5 to 10 minutes after the joint is filled.

3.4.2 Final Cleaning

Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

a. Masonry and Other Porous Surfaces

Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hours then remove by wire brushing or sanding.

3.5 MEASUREMENT AND PAYMENT

Sealant and Caulking shall not be measured and paid for separately, but the cost thereof shall be considered as included in the contract unit price of the Items where called for.

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DIVISION 11 – DOORS AND WINDOWS

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing and supply of materials including equipment, and performing labor necessary to complete the installation of all steel doors and frames as shown on drawings and schedule, and as specified herein.

1.2 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.2.1 American National Standards Institute, Inc. (ANSI) Publications:

A 115.1-82	Preparation for Mortise Locks for 1-3/8 Inch and 1-3/4 Inch Doors
A 115.2-80	Preparation for Bored Locks for 1-3/4 Inch and 1-$^{3}/_{8}$ Inch Doors
A 115.4-82	Preparation for Lever Extension Flush Bolts
A 151.1-80	Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing

1.2.2 Steel Door Institute (SDI) Publications

100-85	Recommended Specifications-Standard Steel Doors and Frames
105-82	Recommended Erection Instructions for Steel Frames
107-84	Hardware on Steel Doors (Reinforcement Application)
111-F	Recommended Completed Opening Anchors for Standard Steel Doors and Frames

1.2.3 Underwriters Laboratories, Inc. (UL) Publications

10B-79	Fire Test of Door Assemblies

1.3 SUBMITTALS

1.3.1 Catalog Data

Manufacturer's descriptive literature for steel doors and frames. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction.

1.3.2 Shop Drawings

Submit drawings for steel doors showing types, sizes, location, elevations, construction details, metal gauges, hardware provisions, installation details and other details of construction.

1.3.3 Certificates of Conformance

Attest that doors, frames, and accessories meet the requirements specified herein. Include the grade and model of each door.

1.3.4 Samples

Two samples of each color for pre-finished doors. Where colors are not indicated, submit manufacturer's standard colors and patterns to the Owner/Engineer for selection.

1.4 DELIVERY AND STORAGE

Deliver doors, frames and accessories undamaged and with protective wrappings or packaging. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 6 mm airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new ones.

PART 2 - PRODUCTS

2.1 STANDARD STEEL DOORS

Standard Steel doors shall conform to SDI 100, except as specified otherwise. Doors shall be either hollow steel construction or composite construction, fabricated from minimum Gauge 18 steel face sheets for exterior doors and Gauge 20 steel face sheets for interior doors. Prepare doors to receive hardware specified in Section 08710, "Finish Hardware." Exterior doors shall have top edge closed flush. Doors shall be 44 mm (1-3/4") thick, unless otherwise indicated. Exterior doors shall be provided with weather-stripping and thresholds.

Metal flush doors using # 18 G.I. panel, 4mm thk., with Honeycomb / Rockwool insulation on # 16 G.I. frame (150mm), single rabbet jamb with SS butt 4.5” x 4” x 3.5 mm thk. (4BB) hinges (4 pcs / panel) with epoxy primer gray. Door sizes & swing as shown on plans.

2.1.1 Door Grades

a. Standard Duty Doors

Standard duty doors shall conform to SDI 100, Model 3 of size and design indicated. Provide where shown on drawings.

b. Heavy Duty doors

Heavy duty doors shall conform to SDI 100, Grade II, Model 3 or 4 of sizes and designs indicated.

2.2 LOUVERS

Door shall be provided with louver section. Louvers shall be sight-proof type, inserted into the doors. Inserted louvers shall be stationary as shown, and formed of not less than Gauge 20 steel. Blades of inserted louvers shall be securely installed into the frame, and the entire assembly shall be fastened to the door to present a neat appearance and to be non-removable from the outside of the door. Insect screens shall be removable type with 18 x 16 mesh stainless steel, aluminum or bronze cloth.

2.3 ASTRAGALS

For pairs of exterior steel doors which will not have aluminum astragals or removable mullions, as specified in Section 08710, "Finish Hardware," provide overlapping steel astragals with the doors.

2.4 STANDARD STEEL FRAMES

Standard steel frame shall conform to SDI 100, except as otherwise specified. Fabricate frames from minimum Gauge 16 commercial grade cold-rolled steel for all exterior and interior steel doors. Form frames to sizes and shapes indicated, welded corners. Provide steel frames for steel doors, unless otherwise indicated.

2.4.1 Welded Frames

Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind weld smooth.

2.4.2 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than Gauge 18.

a. Wall Anchor

Provide a minimum of three anchors for each jamb. Locate anchors opposite top and bottom hinges and midway between.

b. Masonry

Provide anchors of corrugated or perforated steel straps or 5 mm (3/16") diameter steel wire, adjustable or T-shaped.

2.5 WEATHERSTRIPPING

As specified in Section 08710, "Finish Hardware".

2.6 HARDWARE PREPARATION

Reinforce, drill, and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI 107, ANSI A 115.1, ANSI A 115.2, and ANSI A 115.4. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of SDI 100, as applicable.

2.7 FINISHES

2.7.1 Factory-Primed Finish

Unless specified otherwise, phosphate treat and factory prime metal doors and frames as specified in SDI 100.

2.7.2 Factory-Applied Enamel Finish

After factory priming, apply two coats of low-gloss enamel to exposed surfaces. Separately bake or oven dry each coat. Drying time and temperature requirements shall be in

accordance with the coating manufacturer's recommendations. Color(s) of finish coat shall be as indicated and shall match approved color sample(s).

2.8 FABRICATION AND WORKMANSHIP

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Frames

Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction.

3.1.2 Doors

Hang doors in accordance with clearances specified in SDI 100. After erection clean and adjust.

3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until all rust is removed, clean thoroughly, and apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

3.4 METHOD OF MEASUREMENT

Steel doors of the type specified shall be measured by the number of set installed and accepted. A set shall consist of metal door, jambs, anchors and hardware except locksets.

3.5 BASIS OF PAYMENT

The accepted quantity, measured as prescribed in Method of Measurement shall be paid for at the contract unit price for Steel Door, which price and payment shall be full compensation for furnishing and placing all materials, including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 08420 - ALUMINUM DOORS AND FRAMES

PART 1 - GENERAL

1.1 SCOPE

The work includes the supply and furnishings of materials including equipment, and performing labor necessary to complete the installation of all aluminum doors and frames as specified and as show on drawings and schedules.

1.2 APPLICABLE PUBLICATIONS

The publication listed below form a part of this specification to the extent referenced. The publication is referred to in the text by the basic designation only.

1.2.1 Aluminum Association (AA) Publication:

(6th Edition) Designation System for Aluminum Finishes

1.3 SUBMITTALS

1.3.1 Shop Drawings

Shall indicate elevations of aluminum doors and frames, full-size sections, thickness and gages of metal, fastenings, proposed method of anchoring frames, size and spacing of anchors, details of construction, method of glazing, details of operating hardware, method and materials for weather-stripping, installation details and other related items.

1.3.2 Sample

Submit one full size corner showing construction, color and finish.

1.3.3 Door Schedule

Submit schedule with erection drawings indicating location of each door unit.

1.4 DELIVERY AND STORAGE

Deliver aluminum doors and frames to project site in an undamaged condition. Use care in handling and hoisting aluminum doors and frames during transportation and at the job site. Store aluminum doors and components out of contact with the ground, under a weather-tight covering, so as to prevent bending, warping, or otherwise damaging the aluminum doors. Damaged doors shall be repaired to an "as new" condition as approved. If doors cannot be repaired, a new unit shall be provided.

1.5 PROTECTION

Finish surfaces shall be protected during delivery and handling using the Manufacturer's Standard Method, except that no coatings or lacquers shall be applied to surfaces to which caulking and glazing compounds must adhere.

PART 2 - PRODUCTS

2.1 MATERIALS

Aluminum doors and frames shall be designed and constructed with swinging panels and

fixed side panels in the sizes and arrangements indicated. All door and framing sections shall be extruded from AA-6063-T5 aluminum alloy 44mm (1 3/4") thick, to size and shape as shown in drawing and details. Sections shall conform to details, 3 mm (1/8 inch) minimum thickness, and shall present straight, sharply defined lines, and shall be free fromdefects impairing strength or durability. All fasteners shall be of aluminum, stainless steel, cadmium plate or other corrosion resistant materials.

2.2 FABRICATION

2.2.1 Construction and Design

Aluminum doors except for all glass entrance doors shall have narrow stile design unless otherwise shown or specified. Door stiles and rails shall be securely joined and reinforced by means of structural corner block assemblies. Welded corners without structural corner block assembly will not be permitted. Lock and hinge stiles on all double acting doors, and the lock stile of a pair of doors shall incorporate two woven pile weather-strips from top to bottom. Doors shall be adjustable vertically and front to back. Cut-out operations for hardware shall be accurately made and reinforced, as required. Glass stops shall be the snap-on type with non-stretch vinyl beads. Screw fastened stops will not be permitted. Push-pull bars shall have a formed, comfortable grip and concealed mechanical fasteners. All vertical and horizontal door sections shall be installed so as to receive infill thickness as specified in the glazing section of the specifications.

2.2.2 Finishes

All exposed surfaces shall be smooth and free of distracting scratches and blemishes. Interior door frames shall have anodized clean finish. Exterior door frames shall have anodized finish conforming to Aluminum Standards of Architectural Class 1 anodic coding. Color shall be anodized bronze.

2.2.3 Hardware

All doors shall have maximum security deadbolt lock for single doors and maximum security hook bolt lock and 460 mm (18 inches) lever type flush bolts for double doors. Operating hardware shall be offset pivots or center pivots as recommended and supplied by door manufacturer. All push and pull hardware shall be of size and type furnished by door manufacturer.

2.2.4 Weatherstripping

All four sides of each door shall be provided with weather-stripping which shall provide maximum protection against the elements and designed so it may easily be replaced. Provide continuous wool pile, silicone treated or type recommended by door manufacturer.

2.2.5 Glass and Glazing - shall be as specified under Section 08800, "Glazing"

2.2.6 Caulking and Sealing - shall be as specified under Section 07900, "Sealants and Caulking".

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Method of Installation

Plumb, square, level, and align frames and framing members to receive doors and transoms. Anchor frames to adjacent construction as indicated and in accordance with manufacturer's printed instructions.

3.1.2 Protection

Protect doors and frames from damage. Prior to completion and acceptance of the work, restore damaged doors and frames to original condition, or replace with new ones.

3.1.3 Cleaning

Upon completion of installation, thoroughly clean door and frame surfaces in accordance with door manufacturer's recommended procedure. Do not use abrasive caustic, or acid cleaning agents.

3.2 METHOD OF MEASUREMENT

Aluminum glass door, fully equipped with fixing accessories and locking devices shall be measured by the number of set installed as shown on the Plans and accepted.

3.3 BASIS OF PAYMENT

The accepted quantity, measured as prescribed in Method of Measurement shall be paid for at the contract unit price for Aluminum Glass Doors, which price and payment shall be full compensation for furnishing and placing all materials including fixing accessories and locking devices and for all labor, equipment and incidentals to complete the prescribed work in this Section.

Payment will be made in accordance with the Bill of Quantities

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SECTION 08520 - ALUMINUM WINDOWS

PART 1 GENERAL

1.1 SCOPE

The work includes the supply and furnishing of materials, including equipment, and performing labor necessary to complete the installation of all aluminum windows as specified and as shown on drawings and schedules.

1.2 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.2.1 Aluminum Association (AA) Publication:

(6th Edition)	Designation System for Aluminum Finishes

1.2.2 American National Standards Institute (ANSI) Publication:

ANSI/AAMA 302.9-197	Aluminum prime Windows

1.3 SUBMITTALS

1.3.1 Shop Drawings

Shop drawings shall indicate elevations of windows, full-size sections, thickness and gages of metal, fastenings, and proposed method of anchoring, size and spacing of anchors, details of construction, method of glazing, details of operating hardware, method and materials for weather-stripping, installation details and other related items.

1.3.2 Sample

Submit one full size corner showing construction, color and finish.

1.3.3 Manufacturer's Certificate of Conformance

Submit certificates that identical windows have been tested and meet the requirements specified herein for air infiltration and water penetration.

1.3.4 Window Schedule

Submit schedule with erection drawings indicating location of each window unit.

1.4 DELIVERY AND STORAGE

Deliver windows to project site in an undamaged condition. Use care in handling and hoisting windows during transportation and at the job site. Store windows and componentsat the site on edge, out of contact with the ground, under a weathertight covering, so as to prevent bending, warping or otherwise damaging the windows. Damaged window shall berepaired to an "as new" condition as approved. If windows cannot be repaired, a new unit shall be provided.

1.5 PROTECTION

Finished surfaces shall be protected during delivery and handling using the manufacturer's standard method, except that no coating or lacquers shall be applied to surfaces to which caulking and glazing compounds must adhere.

PART 2 - PRODUCTS

2.1 MATERIALS

Aluminum windows shall conform to the requirements of ANSI/AAMA 302.9, ANSI/AAMA A 134.1 and the specifications listed below. Provide windows of combinations, types and sizes indicated or specified. Each window shall consist of a unit including frame, sash, mullions, trim, and anchors, complete. All frame and sash extruded members shall be constructed from 6063-T5 aluminum alloy with a nominal depth of 38 mm (1-1/2") and wall thickness of 3 mm (1/8 inch) for principal members of all solid and tubular shapes. Window unit shall be prime windows of the types specified. Dimensions shown are minimum.

2.1.1 Fixed Windows

Type P-A2.5 of AMMA Specifications.

2.1.2 Awning Windows

Provide each side hinged ventilator with one pair of non-friction-type extension hinges, one sash operator designed to hold ventilator open firmly at any angle up to 90° and one locking handle. Hinges shall have the strength necessary to permanently support the glazed ventilator without twist or sag.

2.1.3 Glass Glazing

Materials are specified under Section 08800, "Glazing".

2.1.4 Caulking and Sealing

Caulking and Sealing shall be specified under Section 07900, "Sealants and Caulking".

2.2 FABRICATION

Window units shall conform to the requirements of Master Specification, Part A, "Architectural" of ANSI/AAMA 302.9.

2.2.1 Drips and Weep Holes

Provide as required to return water to outside.

2.2.2 Glazing Thickness

Design glazed windows and rabbets suitable for glass thickness shown on drawings.

2.2.3 Fasteners

Use flathead, cross-recessed type, exposed head screws and bolts with standard threads on windows, trim and accessories. Screw heads shall be finished flush with adjoining surfaces. Self-tapping sheet metal screws are not acceptable for material more than 1.5 mm (1/16 inch) in thickness.

2.2.4 Provisions for Glazing

Design sash for inside glazing and for securing glass with glazing channels and glazing compound.

2.2.5 Mullions

Provide mullions between multiple windows units designed to withstand the wind load requirements specified. Secure mullions to adjoining construction and window units in such a manner as to permit expansion and contraction and to form a weather-tight joint. Provide mullion covers on the interior and exterior to completely close exposed joints and recesses between window units and to present a neat appearance.

2.2.6 Accessories

Provide windows complete with necessary hardware, fastenings, clips, fins, anchors, glazing beads and other appurtenances necessary for complete installation and proper operation.

2.2.7 Anchors

Build into, bolt to, or otherwise secure anchors and fastenings to the heads, jambs and sills of openings and fasten securely to the windows or frames. Use concealed anchors of the type recommended by the window manufacturer for the specific type of construction. Use fasteners compatible with the fastened materials. Anchor each frame at jambs with a minimum of three adjustable anchors. Provide perforated anchor stems for mortar keying with anchor flanges of sufficient width to provide a sliding friction fit inside frames. Extend perforated stems in less than 100 mm (4 inches) into masonry.

2.2.8 Protective Coating

Clean all surfaces and apply a protective coating of clear, water-white methacrylate-type lacquer, resistant to alkaline mortar and plaster immediately after fabrication. Covering shall not chip, peel or flake due to temperature or weather, and shall protect against discoloration and surface damage from transportation, storage, and construction activities. Covering shall be readily removable without affecting the finish. Covering shall either be adhesive paper, waterproof tape, or strippable plastic and may not be removed even after completion of installation.

2.2.9 Finishes

Exposed aluminum surfaces shall be powdercoated finished. All windows shall have the same finish.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Method of Installation

Install in strict accordance with the window manufacturer's printed instructions and details, except as specified otherwise herein. Build in windows as the work progresses or install without forcing into prepared window openings. Set windows at proper elevation, location and reveal; plumb, square level and in alignment; and brace, strut and stay properly to prevent distortion and misalignment. Bed screws or bolts in sill members, joint at mullions, contacts of windows with sill and built-in fins, in mastic sealant of a type recommended by the window manufacturer. Install windows in a manner that will prevent entrance of water.

3.1.2 Anchors and Fastenings

Make ample provisions for securing units to each other, to masonry, and to other adjoining construction. Windows installed in direct contact with masonry wall shall have head and jamb members designed to recess into masonry wall not less than 11 mm (7/16 inch).

3.1.3 Protection

Where aluminum surfaces are in contact with, or fastened to masonry, wood or dissimilar metals, except stainless steel or zinc, the aluminum surface shall be protected from dissimilar materials as recommended in the Appendix to ANSI/AAMA 302.9.

3.2 CLEANING

Clean interior and exterior surfaces of window units of mortar, plaster, paint, spattering spots and other foreign matter to present a neat appearance and to prevent fouling of weathering surfaces and weather-tripping, and to prevent interference with the operation of hardware.

Replace with new windows all stained, discolored or abraded windows that cannot be restored to their original condition.

3.3 METHOD OF MEASUREMENT

Aluminum windows of the design / style and type of operation specified shall be measured by the number of set installed and accepted.

3.4 BASIS OF PAYMENT

The quantity measured as determined in Method of Measurement shall be paid for at the contract unit price per set of Aluminum Window which price and payment shall constitute full compensation for furnishing and placing all materials inclusive of glazing and accessories and for all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 08710 - FINISH HARDWARE

PART 1- GENERAL

1.1 SCOPE

This specification covers the furnishing of materials including equipment and performing labor necessary to complete the installation of all finish hardware as shown on drawings and schedule, and as specified herein.

1.2 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.2.1 American National Standards Institute (ANSI/BHMA) Publications:

A156.1-81	Butts and Hinges
A156.2-83	Bored and Preassembled Locks and Latches
A156.4-80	Door Controls - Closers
A156.6-79	Architectural Door Trim
A156.7-81	Template Hinge Dimensions
A156.13-80	Mortise Locks and Latches
A156.16-81	Auxiliary Hardware
A156.18-84	Materials and Finishes

1.2.2 Door and Hardware Institute (DHI) Publications

Keying – Procedures, System and Nomenclature (Jan. 1978). Recommended Location for Builder's Hardware for Standard Steel door and Frames (1975).

1.3 SUBMITTALS

1.3.1 Hardware List and Catalog Cuts

Submit for approval by the Engineer a listing of each item of finish hardware and a manufacturers' catalog cut for each different item of hardware. Submit hardware list in the following form:

Hardware	Ref. Publication Type No.	Manufacturer's Name And Catalog No.	UL Mark (if fire) Rate and Listed	BHMA Finish Designation

1.3.2 Hardware Schedule

Submit for approval by the Architect / Engineer. Include for each item the quantity, manufacturer's catalog number, corresponding reference publication type number, size, finish, and key control symbols.

1.3.3 Certified Test Reports

Indicate that each item listed under Hardware Items meets the standard listed for that item. A copy of the listing of proposed hardware items in the current applicable BHMA directories of certified products may be submitted in lieu of test reports.

1.3.4 Keying System

Submit for approval by the Architect / Engineer a keying and master keying system. Also submit key bitting charts to the Architect / Engineer prior to completion of the contract.

1.3.5 Project Reference Samples

Upon delivery of finish hardware to the site, select and tag one item of each different type. Identify each item by reference publication type number and manufacturer's catalog number. Items shall remain on file until similar items have been installed, at which time items on file shall be installed in predetermined locations.

1.4 TEMPLATES

The Contractor shall furnish templates or information otherwise necessary to enable the door and frame manufacturer to make proper provision in his work to receive the specified hardware. Where two or more articles of hardware are to be mounted on the same door, the Contractor shall effect proper coordination between the manufacturers of the different articles. Templates of hinges shall conform to ANSI Standard A156.7.

1.5 DELIVERY AND MARKING

Deliver hardware in original individual containers, complete with necessary appurtenance including fasteners and instructions. Mark each individual container with manufacturer's name and catalog number. Deliver permanent keys to the Architect / Engineer.

PART 2 - PRODUCTS

2.1 HARDWARE MANUFACTURES AND MODIFICATIONS

Provide, as far as practicable, locks, hinges, and closers of one lock hinge, pivot, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

2.2 HARDWARE DESIGNATIONS

Hardware items covered by ANSI/BHMA standards are specified by BHMA designations.

2.3 TEMPLATE HARDWARE

Hardware to be applied to metal shall be made to template. Promptly furnish template information or templates to door and frame manufacturers. Template hinges shall conform to ANSI/BHMA A156.7. Coordinate hardware items to prevent interference with other hardware.

2.4 HARDWARE ITEMS

Conform to the respective standards listed and to requirements specified herein. Hinges, pivots, locks, latches, exit devices, bolts, and closers shall bear the manufacturer's name or trademark where it will be visible after the item is installed. For closers with covers, the

name or trademark may be beneath the cover. Provide hardware items as specified below and as listed under “Hardware Schedule” indicated on the drawings.

2.4.1 Hinges

ANSI/BHMA A156.1, 113 mm x 113 mm (4-1/2 by 4-1/2 inches) unless otherwise specified. Construct loose pin hinges for exterior doors and reverse-bevel interior doorsso that pins will be non-removable when door is closed. Other anti-friction bearing hinges may be provided in lieu of ball-bearing hinges.

2.4.2 Locks and Latches

ANSI/BHMA A156.2and ANSI 156.13, Series 4000, Grade 1. Provide trim of wrought construction and commercial plain design. Locks for exterior doors shall have threaded roses or concealed machine screws.

2.4.3 Lock Cylinders

Provide cylinders for new locks including locks provided under other sections of these specifications. Cylinders shall have six pin tumblers and shall be products of the same manufacturer. Provide a master keying system.

2.4.4 Keys

Furnish one file key, one duplicate key, and one working key for each key change and for each master keying system; furnish one additional working key for each lock of each keyed-alike group. Stamp each key with appropriate key control symbol. Do not place room number on keys.

2.4.5 Closers

ANSI/BHMI A156.4, Series CO2021, and Grade 1. Provide closers complete with brackets, arms, mounting devices, fasteners, and other features necessary for the particular application. Size closers in accordance with manufacturer’s recommendations and list sizes in the Hardware Schedule.

a. Identification Marking

In addition to the manufacturer’s name or trademark, each closer shall bear the manufacturer’s size designation where it will be visible after installation.

b. Special Tools

Provide special tools for adjustment of door closing devices, such as spanner and socket wrenches.

2.4.6 Thresholds

In accordance with type indicated on the drawings with vinyl or silicone rubber insert in face of stop and ANSI/BHMA A156.6.

2.4.7 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

2.5 FASTENERS

Furnish fasteners of proper type, quality, size, quantity, and finish with hardware. Fasteners exposed to weather shall be of nonferrous metal or stainless steel. Usefasteners of type necessary to accomplish a permanent installation.

2.6 FINISHES

ANSI/BHMA A156.18. Hardware shall have BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except surface door closerswhich shall have aluminum paint finish, and except steel hinges which shall have BHMA finish. Exposed parts of concealed closers shall be finished to match the doors. Hardware for aluminum doors shall be finished to match the doors.

PART 3 - EXECUTION

3.1 INSTALLATION OF HARDWARE

Install hardware following manufacturers' instructions. Except as indicated or specified otherwise, use fasteners furnished with hardware to fasten hardware in place. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Use machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Use toggle bolts where required for fastening to hollow core construction. Use through bolts where indicated or specified and where necessary for satisfactory installation.

3.2 ACCEPTANCE

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of operation testing 10 days before schedules, so that the testing can be witnessed. Hinges, locks, latches, bolts, holders, closers, and other items shall be adjusted to operate properly. Also demonstrate that tagged keys operate respective locks. After hardware is checked, deliver tagged keys to the Engineer. Correct, repair, and finish as directed errors in cutting and fitting and damage to adjoining work.

3.3 LABELED DOORS

Install hardware for fire doors in accordance with NFPA requirements.

3.4 LOCATION OF HARDWARE ON HINGED DOORS

Locate as follows, unless indicated or specified otherwise herein:

3.4.1 Locks

Locate knobs so that center line of strike is 1.023 meters (40-5/16 inches nominal) above bottom of door frame.

3.4.2 Hinges

Locate as follows:

a. Top Hinge	Not over 285 mm (11-1/4 inches) from inside of frame rabbet at head to center line of hinge
b. Bottom Hinge	Not over 330 mm (13 inches) above bottom of door frame to center line of hinge
c. Center Hinge	Midway between top and bottom hinges

d. Intermediate Hinges Equally spaced between top and bottom hinges

3.4.3 Door Closing Devices

Shall be installed and adjusted in strict accordance with the templates and printed instructions.

3.5 KEY CABINET

Locate where directed. Key as directed by the Architect / Engineer.

3.6 METHOD OF MEASUREMENT

Center pivot, threshold, dead locks, door sets, closets, push / pull bars and panic device shall be measured by the number of sets installed and accepted.

Flush bolts and hinges shall be measured by the number of pairs installed and accepted.

3.7 BASIS OF PAYMENT

The quantities accepted, measured as provided in Method of Measurement, shall be paid for at the contract unit price for the several Pay Items listed below and shown in the Bill of Quantities which price and payment shall be full compensation for furnishing and placing all materials, including labor, equipment, tools and incidentals necessary to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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DIVISION 12 – FINISHES

SECTION 09601 - EPOXY COATING

PART 1- GENERAL

1.1 SCOPE

This specification covers the furnishing of materials including equipment and performing labor necessary to complete the installation of epoxy flooring as shown on the drawings and as specified herein.

1.2 SUBMITTALS

1.2.1 Product Data

Submit manufacturer's technical information including basic materials analysis and application instructions for each coating material specified.

1.2.2 Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Resubmit samples as requested by the Architect / Engineer until the required sheen, color and texture is achieved.

1.3 QUALITY ASSURANCE

1.3.1 Single Source Responsibility

Obtain primary chemical-resistant seamless, epoxy coating materials including primers, resins, hardening agents, finish or sealing coats from a single manufacturer with not less than 3 years of successful experience in supplying principal materials for work of type described in this section. Provide secondary materials only of type and from source recommended by manufacturer of primary materials.

1.3.2 Prime Coat

Apply primer over prepared substrate at manufacturer's recommended spreading rate. Coordinate timing of primer application with application of topping mix to insure optimum adhesion between chemical-resistant epoxy coating materials and substrate.

1.3.3 Finish or Sealing Coat

After topping mix has cured sufficiently, apply finish or sealing coat of type required by the manufacturer to produce required finish indicated and in number of coats and spreading rates recommended by manufacturer.

1.4 FIELD QUALITY CONTROL

a. The Owner reserves the right to invoke the following material testing procedure at any time, and any number of times during period of epoxy application.

    1. The Owner will engage service of an independent testing laboratory to sample materials being used. Samples of material will be taken, identified and sealed, and certified in the presence of Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

Epoxy coating shall conform to the respective specification and standards and to the requirements specified herein.

a. Epoxy coating shall be two component epoxy resins and polyamide curing agent and shall be used as follows:

b. Epoxy coating shall be solvent-free two components colored epoxy for self-smoothening screeds.

1. Self-smoothening floor: (2-3mm layer thickness)

- Primer
- Self-smoothening floor

Color and texture shall be as approved by the Architect / Engineer and Owner.

PART 3 - EXECUTION

3.1 INSTALLATION

Comply with epoxy coating manufacturer's written instructions for installation of epoxy coating system, including surface preparation, joint treatment, flashing, reinforcement, accessory items and surfacing. Apply materials by methods as instructed by epoxy manufacturer to provide uniform thickness.

3.1.1 Coordination

Proceed with epoxy work only after substrate construction, including curbs; spill dams and equipment pads, and penetrating work through substrate have been completed. Nophased construction will be permitted.

3.2 ADJUSTING, CLEANING AND PROTECTION

a. Upon completion of the work, repair surfaces that have been permanently stained, marred, or otherwise damaged. Replace work that is damaged or cannot be adequately cleaned as directed.

b. Upon completion of the work, remove unused materials, debris, containers and equipment from the project site. In addition to the initial cleaning procedure required, clean the work before acceptance by the Owner.

c. Protect the work during the construction period so that it will be without any indication of use or damage at the time of acceptance.

1. Until the epoxy coating is fully cured and protected with a temporary covering during the construction period, keep the coating areas free from traffic and other trades. Construction Manager shall provide necessary temporary protection to prevent damage, such as caused by traffic, gouging, scraping, spillage of deleterious substances, excessive heat, or other manner.

3.3 METHOD OF MEASUREMENT

Epoxy coating shall be measured by the number of square meters installed and accepted.

3.4 BASIS OF PAYMENT

The quantity as determined in Method of Measurement, shall be paid for at the contract unit price per square meter for Epoxy Coating which price and payment shall constitute full compensation for furnishing and placing all materials and for all labor, equipment, tools and incidentals necessary to complete the prescribed work in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 09703 - PLASTERING

PART 1 - GENERAL

1.1 SCOPE

The work under this section of the specification covers the furnishing of materials including equipment and performing labor necessary for the complete installation of plastering work as shown on drawings and as specified herein.

1.2 GENERAL REQUIREMENTS

Portland-cement plaster as included herein shall be applied as specified hereinafter to those areas indicated in the finish schedule. Plaster may be applied directly to interior masonry walls.

1.3 DELIVERY AND STORAGE

Deliver manufactured materials in the manufacturer's original unbroken packages or containers that are labeled plainly with the manufacturer's names and brands. Keep cementitious materials dry and stored off the ground, under cover, and away from sweating walls and other damp surfaces until ready to be used.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Portland Cement Plaster

Maintain an ambient temperature of not less than 27 degrees C continuously where plastering work will be done. Maintain this temperature for not less than 48 hours prior to the application of plaster while the plastering is being done and during the curing operation.

1.4.2 Protection from Sun and Dry Winds

During the application of the finish coat, and for a period of 48 hours following the completion of finish coat application for any given area, the surface of the plaster shall be protected from direct sunlight and direct winds. Use of tarpaulins or other temporary means may be acceptable. Moist curing shall be provided in accordance with paragraph 3.3, Portland Cement-Lime Plaster.

PART 2 - PRODUCTS

2.1 MATERIALS

Provide materials conforming to specifications and the requirements specified.

2.1.1 Portland Cement

ASTM C 150, gray Portland cement Type I.

2.1.2 Hydrated Lime

ASTM C206, Type S

2.1.3 Aggregates

Sand for Portland Cement Lime Plaster shall be ASTM C 144, except gradation of sand shall conform to the following requirements.

2.1.3.1 Sand Gradation for Basecoats:

Percentage Retained by weight (plus or minus 2 percent) on each sieve

Sieve	Min	Max
No. 4		0
No. 8	0	10
No. 16	10	40
No. 30	30	65
No. 50	70	90
No. 100	95	100

2.1.3.2 Sand for Finish Coats

Sand for finish coat shall be near white and shall be graded within the limits shown above for basecoats, except that the sand shall pass the No. 8 sieve, and for smooth finish the sand shall pass the No. 30 sieve.

2.1.3.3 Water

Clean, fresh, suitable for domestic consumption, and free of mineral and organic substances that affect the hardening or durability of the plaster.

2.2 PROPORTIONING AND MIXING

Except where specified otherwise, materials are specified on a volume basis and shall be measured in approved containers, which will ensure that the specified proportions will be controlled and accurately maintained during the progress of the work. Measuring materials with shovels "shovel count" will not be permitted. Ready-mix plasters shall be prepared for use by the addition of water only.

2.2.1 Basecoat Proportions

2.2.1.1 Portland Cement-Lime Plaster Basecoats

Mix scratch coat in the proportion of one part by volume of Portland cement to not more than 3/4 part by volume of hydrated lime and not less than 2-1/2 nor more than 4 parts by volume of damp loose sand. Mix brown coat in the proportion of one part by volume of Portland cement to not more than 1/2 part by volume hydrated lime and not less than 3 nor more than 5 parts by volume of damp loose sand. Workability shall govern the actual amount of lime and sand used in the scratch and brown coats.

2.2.2 Finish Coat Proportions

2.2.2.1 Portland Cement-Lime Plaster Finish Coat

Mix finish in the proportion of one part by volume of Portland cement to not more than one part by volume of hydrated lime, and not more than 4 parts by volume of damp loose sand. Workability shall govern the actual amount of lime and sand used in the finish coat, within the limits specified herein. Where smooth toweled finish is indicated, allow plaster to set up to the extent that it does not flow ahead or under the trowel, yet has not solidified, then trowel the face lightly to embed the granules. Do not over-trowel or burnish the surface.

2.3 MIXING

Mix materials in approved mechanical mixers of the type in which the quantity of water can be controlled accurately and uniformly, except that finish coats containing lime may be hand mixed. While the mixer is in continuous operation, add approximately 90 percent of the estimated quantity of water, half of the sand, all of the cementitious materials, and introduce the other one-half of the sand into the mixer in that sequence and mix thoroughly with the remainder of the water until the mixture is uniform in color and consistency. Avoid excessive mixing or agitation. Discard plaster which has begun to set before it is used; re-tempering will not be permitted. Do not use caked, or lumped materials. Empty mixers and mixing boxes after each batch is mixed, and keep free of old plaster.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES

Clean surfaces to which plaster is to be applied of all projections, dust, loose particles, grease, bond breakers, and foreign matter. Do not apply plaster directly to (1) surfaces of masonry or concrete that has been coated with bituminous compound or other waterproofing agents, or (2) to surfaces that have been painted. Before plaster work is started, wet masonry and concrete surfaces thoroughly with a fine fog spray of clean water to produce a uniformly moist condition. Check metal grounds, corner beads, screeds, and other accessories carefully for alignment before the work is started. Check expansion and control joints and supporting metal structures to ensure that expansion and control joints can move unrestrained.

3.2 APPLICATION OF PLASTER

3.2.1 General

Plaster may be applied by hand or by machine. When a plastering machine is used the fluidity of Portland cement-lime plaster shall be controlled to have a slump of not more than 63 mm when tested using a 50 by 100 by 150 mm high slump cone. Subsequent to determining water content to meet this slump, do not add additional water to the mix. Conduct the slump test according to the following procedure:

a. Place cone on level, dry, non-absorptive base plate.

b. While holding cone firmly against base plate, fill cone with plaster taken directly from the hose or nozzle of the plastering machine, tamping with metal rod during filling to release air bubbles.

c. Screed off plaster level with top of cone. Remove cone by lifting it straight up with a slow and smooth motion.

d. Place cone in a vertical position adjacent to freed plaster sample, using care not to jiggle base plate.

e. Lay a straight edge across top of cone, again being careful not to vibrate cone. Measure slump in inches from the bottom edge of the straightedge to the top of the slumped plaster sample.

3.2.2 Workmanship

Apply plaster in three coats, except as follows:

a. Provide scratch coat. Apply base coats with sufficient pressure and plaster shall be sufficiently plastic to provide a good bond to bases. Work base coats into screed at

intervals of from 1.50 to 2.40 meters. Plaster shall not be continuous across expansion and control joints occurring in walls, and partitions. Finish plasterwork level, plumb, square, and true, within a tolerance of 3 mm in 2.40 meters, without waves, cracks, blisters, pits, crazing, discoloration, projections, or other imperfections. Form plasterwork carefully around angles and contours, and well up to screeds. Special care shall be taken to prevent sagging and consequent dropping of applications. There shall be no visible junction marks in finish coat where one day's work adjoins another.

3.3 PORTLAND CEMENT – LIME PLASTER

Apply base coats with sufficient pressure to curl the keys around the back of metal lath or wire fabric and to provide good bond on masonry or concrete bases.

3.3.1 Plaster except Scratch Coat for Ceramic Tile Backing

Apply in three coats to a thickness of not less than 16 mm. Apply the scratch coat not less than 6 mm thick, lightly score horizontally, and moist cure for not less than 24 hours. Apply the brown coat after the scratch coat has been aged at least 24 hours in addition to the moist curingperiod. Apply the brown coat to bring the base coat out to the screeds, compact and straightento a true surface with rod and Darby, and float to receive the finish coat. After the brown coat has been moist cured for not less than 24 hours and aged at least than additional 5 days, applythe finish coat to a thickness of not less than 3 mm. Where any previous coat has become dry,dampen the surface evenly with water, prior to the application of the next coat. The finish coatfor plaster shall have a troweled finish. Moist cure plaster for 24 hours using a fine fog spray ofwater and apply to the finish coat as frequently as required to prevent dry-out of the plaster. Donot saturate the plaster to the point where free water stands on the surface. Prevent staining ofthe finish coat. Provide moist curing.

3.3.2 Scratch Coat for Ceramic Tile and Marble Backing

Apply scratch coat and keep continuously damp for not less than 24 hours before tile is to be set. Apply scratch coat in thickness indicated or as necessary to bring the face of the tile and marble to the required plane, but not les than 6 mm from the face of the material it is being applied to and with a level surface within a tolerance of 6 mm in 2.40 meters. Apply scratch coat after substantial grounds, plugs, hangers and other electrical outlets, and other fixtures and fittings have been installed that are to be secured to tiled and marbled surfaces. Apply scratch coat with sufficient pressure to ensure a proper bond and key with the base and a proper base for the setting bed. While the mortar is still plastic, cut the scratch coat with a trowel at internal vertical angles to the depth of the coat and for the full height of the tile bed, score horizontally or cross-scratch coats within one hour after mixing, and at no time shall the mortar be re-tempered. Protect scratch coat and keep moist during curing period. A leveling coat of the same mix specified for the scratch coat shall be applied over the scratch coat when the surface of the scratch coat is not level within the specified tolerance or when a base coat thickness of more than 19 mm is required. Scratch leveling coat and cure for not less than 24 hours.

3.4 PATCHING AND POINTING

Upon completion of the building, cut out and patch loose, cracked, damaged, or defective plaster. Patching shall match existing work in texture, color and shall be finished flush with plaster previously applied. Do pointing and patching of plaster work abutting or adjoining any other finish work in a neat and workmanlike manner. Remove plaster droppings or spattering from surfaces, in condition ready to receive paint or other finish. Remove protective covering from floors and other surfaces, and rubbish and debris from the building.

3.5 METHOD OF MEASUREMENT

All cement plaster finish shall be measured in square meters or part thereof for work actually completed and accepted.

3.6 BASIS OF PAYMENT

The quantity measured as provided in Method of Measurement shall be paid for at the contract unit price per square meter of Cement Plaster Finish which price and payment shall constitute full compensation for furnishing and placing all materials and for all labor, equipment, tools and incidentals to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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SECTION 09910 – PAINTING WORKS

PART 1 - GENERAL

1.1 SCOPE

This specification covers the furnishing of materials, equipment and labor necessary to complete all field painting works on buildings as shown and indicated on the drawings and schedule of finishes as well as specified herein.

1.2 DELIVERY AND STORAGE

Deliver coatings and coating materials in unopened original container bearing the manufacturer's name and brand designation, specification number, batch number, color, date of manufacture, and manufacturer's instruction for application. Restrict storage of coatings and coating materials and the mixing of coatings to the locations directed.

1.3 SELECTION OF COLORS

Colors of finish coats shall be as approved by the Architect / Engineer. Manufacturer's name and color designation, if indicated, are used for the purpose of color designations only and are acceptable for use on this project only if they conform to all specified requirements. Products of other manufacturers are acceptable if the color closely approximate the colors indicated and the product conforms to all specified requirements.

1.4 DESCRIPTION OF WORK

Surfaces concealed by portable objects and by surface mounted articles readily detachable by removal of fasteners such as screws and bolts are included in the work. Surfaces concealed and made inaccessible by panel boards, fixed ductwork, machinery, and equipment fixed in place are not included. Remove articles obstructing access to those surfaces specified to be included in the work and restore to their original position on completion. Do not coat surfaces in concealed spaces unless specifically so stated. Do not coat surfaces of steel to be embedded in concrete. Do not coat copper, stainless steel, and aluminum except where specifically so stated and except where surfaces have existing coatings. Do not coat new factory finished material except those that require identification or color coding and those factory-finished surfaces which are damaged during installation. Restore damaged factory-finished surfaces to their original condition. Do not paint zinc-coated ducts, zinc-coated pipe, or copper pipe in concealed spaces.

1.4.1 Exterior Painting

Includes new surfaces, including items on or a part of the roof which are not factory-finished.

1.4.2 Interior Painting

Includes new surfaces, and appurtenances of the types listed. Where a space or surface, supports, hangers, and miscellaneous metalwork, except as specified otherwise herein.

1.4.3 Mechanical and Electrical Painting

Includes the field coating as required of interior and exterior piping, conduit, ductwork, supports, hangers, air grilles, registers, miscellaneous, and coverings where required, except as specified otherwise herein.

PART 2 - PRODUCTS

2.1 MATERIALS

Paints enamels, coating, primers and stains shall be "best-in-line" product.

2.1.1 Lead Content

Do not use coatings having a lead content of over 0.06 percent by weight of nonvolatile content.

PART 3 - EXECUTION

3.1 PROTECTION OF AREAS AND SPACES

Remove, mask, or otherwise protect prior to surface preparation and painting operations such items as hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixture, and similar items in contact with coated surfaces. Following completion of painting, reinstall removed items utilizing workmen skilled in the trades involved for such removal and reinstallation. Protect from contamination by coating materials all surfaces not to be coated. Restore surfaces that are contaminated by painting materials to original condition.

3.2 PREPARATION OF SURFACES

Remove all dirt, rust, scale, splinters, loose particles, grease, oil and other deleterious substance from all surfaces which are to be coated or otherwise finished. Allow putty to set one week before coating. Caulking and glazing compounds shall be allowed to cure for times stated in manufacturer's literature prior to being coated. Sandpaper entire surface of existing enamel and other glossy surfaces before application of any coatings. Inspect surfaces after preparation and receive approval before application of any coatings. On surface to be coated with water thinned coatings, spot prime with a brush all exposed nails and other ferrous metal with zinc chromate primer.

3.2.1 Wood Surfaces

Surfaces shall be free from dust and in an approved condition to receive the paint or other finish. Do not use water on uncoated wood. Prior to application of paint, treat knots and resinous wood with an application of knot sealer. Putty cracks and nail-holes after the priming coat has been applied and has dried properly. Prime coat wood doors, frames and trim immediately following delivery to the job site. Sandpaper the entire area previously painted interior wood surfaces; scrape as necessary to remove loose coatings. Set and putty stop all nail heads. Where checking of the wood is present, sand the surface down smooth, wipe and apply a coat of pigmented orange shellac and allow to dry before additional paint is applied. Fill open joints and all other openings whiting putty.

3.2.2 Concrete and Masonry

Remove dirt, fungus, grease, and oil prior to application of coatings. Wash new surfaces with a solution composed of from 14 to 56 grams of tri-sodium phosphate per 1 liter of hot water and rinse thoroughly with fresh water. Wash previously coated surfaces with a suitable detergent and rinse thoroughly. Remove glaze, all loose particles, and scale by wirebrushing. Remove efflorescence by scraping, wire brushing, and washing with 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid and then wash thoroughly with fresh water, removing all traces of the acid. Give all new surfaces to be painted with other than cement-water paint a neutralizing treatment consisting of 0.23 kg. of zinc sulphatein 1 liter of warm water. Apply the neutralizer liberally and allow to dry, then rinse the surfaces thoroughly with clean water and allow to dry for not less than 48 hours before paintis applied.

3.2.3 Plaster

Prior to painting, repair all joints, cracks, holes, and other surface defects with patching plaster or spackling compound and sand out smooth. New plaster to be coated shall have an instrument-measured moisture content of not more than 8 percent. In addition to moisture content requirements, allow new plaster to age a minimum of 30days before application of coating.

3.2.4 New Unprimed Metal Surfaces

Solvent clean zinc-coated surfaces with mineral spirits and wipe dry with clean, dry cloths. Immediately after cleaning and treating, apply pretreatment wash primer, to a dry film thickness of 0.2 to 0.5 mil on zinc-coated, and ferrous surfaces. Apply primer as soon as practicable after pretreatment has dried. Surface preparation shall be in strict compliance with Steel Structure Painting Council, SSPC SP-10, Near White Blast Cleaning also known as through blast cleaning using dry abrasive.

3.2.5 New Hot Metal Surfaces

Clean new surfaces down to clean bare metal free of mil scale, rust, oil, oxides, dust, coatings and contaminates. Apply new coatings before any new oxidation or contamination begins. Surface preparation shall be in strict compliance with steel structures. Painting SSPC-SP-10 near white metal blast cleaning also known as thorough blast cleaning using dry abrasive.

3.3 APPLICATION

Provide finished surfaces free from burns, drops, ridges, waves, laps, brush marks, and variations in colors. Avoid contamination of other surfaces and repair all damage thereto. Allow sufficient time between coats to permit thorough drying and provide each coat in proper condition to receive the next coat. Each coat shall cover the surface of the preceding coat or surface completely; there shall be an easily perceptible difference in shades of successive coats. Thoroughly clean dust-free before and during the application of coating material. Prior to erection, used two coats of the designated primer to treat and prime wood and metal surfaces, which will be inaccessible after erection. Thoroughly work painting materials into all joints, crevices, and open spaces. Finished surfaces shall be smooth, even and free of defects. Retouch damaged painting before applying succeeding coats of paint. Spray painting operations shall comply with the best procedural trade practice. Procure and utilize the engineering controls and/or personal protective equipment necessary for safe and effective application of specified paint systems. Apply strains in accordance with the manufacturer's printed instruction.

Storing, thinning, mixing, handling and applications of painting materials shall be in strict compliance with the manufacturer’s recommendation and instruction. Unless otherwise recommended by the paint manufacturer, painting shall be done when:

a. Metal surface temperature is at least 3°C more than dew point temperature

b. Ambient temperature is above 10°C

c. Relative humidity is less than 85%

d. Application of paints shall be done by Airless Spray Equipment. Pigmented and catalyzed materials shall be thoroughly mixed and strained before applying. Materials that have not been applied within the pot life period specified by manufacturer shall be discarded and properly disposed of.

3.3.1 Equipment

Apply coatings carefully with good, clean brushes or approved spray equipment, except as specified otherwise. Spray areas made inaccessible to brushing by ducts and other equipment. Use airless type spray equipment. Use approved rollers for the application of flat latex coatings to interior walls and ceilings.

3.3.2 Thinning of Paints

Reduce to proper brushing consistency by adding fresh paint, except that when thinning is not mandatory for the type of paint being used.

3.3.3 Environmental Conditions

Do not apply exterior coatings in rainy weather or when the temperature of the air at the surface is over 35 degrees C. Apply interior coatings when the surfaces to be painted are dry and the temperature can be kept below 95 degrees F during the applications of ordinary paints, between 65 degrees F and 95 degrees F during the application of enamels and varnishes.

3.3.4 Special Requirements for Coating Concrete Masonry Surfaces with Acrylic Emulsion Paint

Requires containers be marked for the formulation and mixing of fill coat. The fill coat shall conform to these markings except as specified herein.

a. Mixing of Fill Coat

The formula given in Acrylic Emulsion Paint for the content of the fill coat requires a definite amount of water to be added in preparation of the mixture. This requirement shall not apply. Deliver the sand, cement, and mixing liquids pre-proportioned and packaged so that field proportioning will not be required. Field mix the mixing liquid with the sand and cement; after this mixture is thoroughly blended, add water as necessary to produce a rich, creamy mixture of proper brushing consistency. Mix the fill coat materials by hand but do not vigorously agitate. After mixing, allow to set for 10 minutes to permit air to escape before applying. The fill coat mixture will gradually thicken with time; add small amounts of water, when necessary, to keep the mixture a rich brushing consistency. Do not begin mixing more than one hour before application.

b. Wetting of Surface

Before applying filler coat, thoroughly wet the masonry and concrete to control surface suction and provide a reserve of moisture to aid in curing the paint. A garden hose nozzle adjusted to a fine spray is adequate for the purpose. Do not dampen with a brush dipped in water. Dampen the masonry and concrete in one operation not more than one hour nor less than 30 minutes before painting. Apply the spray in such manner that each part is sprayed three or four times for about 10seconds. Allow time between applications for the water to soak into the surface. If the surface tends to dry rapidly, as in hot weather, re--dampen slightly just in advance of painting. The surface shall be moist but without free water when paint isapplied.

c. Application

Do not paint when the paint may be exposed to temperatures below 40 degrees F within 48 hours after application or when the temperature is over 95 degrees F. Rub the filler coat into the surface in such a manner as to fill all depressions, holes, voids, joints, and hollows. Apply the filler coat with stiff fiber bristle brushes with bristles not longer than 2-1/2 inches, using a circular motion. Give the surface a final stroke parallel to the course of block. Provide uniform coverage and laps well brushed out. Apply the first finish coat at a rate of not less than one gallon per 250 square feet; apply the second finish coat at the rate of not less than one gallon per 300 square feet. Brush apply finish coats, except that behind large ducts and similar locations

inaccessible to a brush they may be applied by rollers. Spray application will not be permitted. Deliver all paint to the job site prior to application. Compute the amount of finish coat paint required and submit calculations for approval. Do not begin painting until this amount has been approved and delivered to the job site. Apply all delivered paint. Keep paint in tightly covered containers when not in use; keep stirred to maintain uniform color and consistency during application. At least 24 hours shall lapse between coats; do not start another coat until the preceding coat has become so hard that it cannot be marked with the brushes used. In hot weather, slightly moisten the prior coat before applying the succeeding coat.Covering is not necessary.

3.3.5 Paint Systems

New surfaces made by cleaning operations, shall receive the following coatings. Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a dry film thickness of not less than 1.0 mil. each coat except as specified otherwise. Where coating thickness is specified, it is the minimum dry film thickness.

a. Exterior and Interior Surfaces

(1) Exterior Concrete / Masonry and Plaster Surfaces

Primer: Acrylic solvent base coating primer
Putty: Acrylic solvent base putty
Two coats of 100% acrylic latex paint

(2) Metal Surfaces

1st Coat: Red Oxide Primer
2nd and Third Coat: Quick Dry Enamel

(3) Interior Concrete / Masonry and Plaster Surfaces

First Coat: Flat Latex
Putty: Masonry Putty
2nd and Third Coat: Odorless Water Base Interior Paint

(4) Interior/ Exterior Masonry

1st Coat: 100% Acrylic Water Based

Putty:

- Acrylic Solvent Water Based Putty for Interior
- Masonry Water Base Putty for Exterior

2nd and Third Coat:

100% Acrylic Latex Paint

b. Interior Surfaces Not Specified Otherwise

(1) Wood Surfaces

1st Coat: Flat Alkyd Type Paint

Putty: Alkyd Type Putty

2nd and Third Coat: Alky Type Enamel Paint

c. Oil Wood Stain Lacquer Varnish Products that highlights wood grains, adds freshness and color and protect interior paneling, furniture, doors, cabinets and other woodworks.

1st Coat:	Oil Wood Stain (any desired color)
2nd and Third Coat:	Lacquer Sanding Sealer (Commercial Grade Nitro-cellulose based sealer)
4th and 5th Coat:	Clear glass Lacquer (nitro cellulose solvent based high gloss lacquer varnish finished)

d. Coat other surfaces for which the type of coating has not been specified herein as specified for surfaces having similar conditions of exposure.

e. Mechanical, Electrical and Miscellaneous Metal Items, Except Hot metal Surfaces and New Pre-finished Equipment

Pre-finishing of new mechanical and electrical equipment is specified in the section covering the particular item.

3.4 METHOD OF MEASUREMENT

Painting of concrete, wood and metal surfaces shall be measured by the number of square meters applied and accepted.

3.5 BASIS OF PAYMENT

The quantity measured as provided in Method of Measurement shall be paid for at the contract unit price, respectively for each of the Pay Items listed below and shown in the Bill of Quantities, which price and payment shall constitute full compensation for furnishing and placing all materials and for all labor, equipment, tools and incidentals to complete the work prescribed in this Section.

Payment will be made in accordance with the Bill of Quantities.

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Philippine Coast Guard
HEADQUARTERS COAST GUARD LOGISTICS SYSTEM COMMAND
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE
CBGF, Muelle Dela Industria Compound, Binondo
1006 Manila

PROJECT TITLE : CONSTRUCTION OF COAST GUARD LIGHT STATION CONRADA
LOCATION :BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS LEYTEOWNER : PHILIPPINE COAST GUARD
SUBJECT : SCOPE OF WORKS (SUMMARY) and GENERAL NOTES

SCOPE OF WORKS:

A. GENERAL REQUIREMENTS

1. The Contractor shall conduct through site inspection of the existing job site conditions.

2. The Contractor shall conduct soil bearing test with at least 1 borehole for the Coast Guard Light Station Conrada.

3. The Contractor shall secure documents needed for processing to obtain building permit. Also, the contractor should shoulder all government fees for this project.

4. The Contractor shall construct and place a project billboard / signage in front of the project site.

5. Clearing and cleaning of all areas affected during the implementations of the project.

6. Furnish pictures to Coast Guard Infrastructure Development Service (CGIDS) or email at cgids.operations@gmail.com for the pre/post repair of the project for monitoring purpose of the National Headquarters Philippine Coast Guard (NHPCG).

B. LAND DEVELOPMENT

B.I GRAVEL BEDDING

1. Supply of, labor, materials; tools and equipment for backfilling and compaction location as indicated in the plan. Gravel fill materials shall consist of approved site materials and shall be free from brush, roots and other unsuitable materials which would be detrimental to compaction requirements.

B.II PERIMETER FENCE AND GATE

1. Supply of labor, tools and equipment for the excavation in preparation for concreting of footing and column footing, wall footing sizes, depths and location as indicated in the plan. Excavation shall be to the depths indicated reckoned either from the natural grade line (NGL) or finish grade whichever is lower.

2. Supply of materials, labor, tools and equipment for backfilling and compaction location as indicated in the plan. Backfill materials shall consist of approved site excavated materials and shall be free from brush, roots and other unsuitable materials which would be detrimental to compaction requirements.

3. Supply of materials, labor, tools and equipment for the fabrication and installation of reinforcing bars including tie wires, usage of tools and equipment to complete the work.

4. Supply of materials, labor, tools and equipment for the fabrication, installation, stripping and/or leaving of formworks with the actual surface in contact with the concrete, including provision of block-outs, chamfered edges, notching, and overlaps, necessary greasing and/or coating with form oil, all necessary hardware, fixing accessories, scaffolding, shoring, and staging.

5. Supply of materials labor tools and equipment for the placing of concrete including necessary grouting, vibrating, hammering, tamping, consolidating, curing, hardening, wetting, sealing, brooming and scratching, protecting, sampling, provision of necessary extended chutes, and mixing boards usage of equipment and tools.

6. Supply of labor, materials, tools and equipment for the construction of masonry walls (150mm thk (6”) for walls and plastering of 25mm thick of masonry walls, blocks including lintel beams, stiffeners and sundry items such as tie wires, sealants, mortar and joint filler and other necessary materials to complete the works, location as described on plans and specifications.

7. Supply of labor, materials, and tools for General (3-coats) painting on all surfaces i.e. masonry and concrete surfaces, ceilings, baseboards, casing including metal / steel surfaces, including surface preparation, primer tools and its use and all necessary accessories to complete the work.

8. Supply of materials, labor, tools and equipment for the fabrication and installation of steel attachment using angle bar and its accessories and usage of tools and equipment to complete the work, location as described on plans and specifications.

9. Supply of materials, labor, tools and equipment for the fabrication and installation of steel gate and its accessories and usage of tools and equipment to complete the work, location as described on plans and specifications.

C. LIGHT HOUSE

1. The Contractor shall conduct through site inspection of the existing job site condition.

2. The Contractor shall construct all Architectural, Structural works in accordance with the plans and specification. All items shown on the plans but not mentioned in the specification shall be included.

3. Supply of labor, tools and equipment for the excavation in preparation for concreting of footing and column footing, wall footing sizes, depths and location as indicated in the plan. Excavation shall be to the depths indicated reckoned either from the natural grade line (NGL) or finish grade whichever is lower.

4. Supply of materials, labor, tools and equipment for backfilling and compaction location as indicated in the plan. Backfill materials shall consist of approved site excavated materials and shall be free from brush, roots and other unsuitable materials which would be detrimental to compaction requirements.

5. Supply of materials, labor, tools and equipment for the fabrication and installation of reinforcing bars including tie wires, usage of tools and equipment to complete the work.

6. Supply of materials, labor, tools and equipment for the fabrication, installation, stripping and/or leaving of formworks with the actual surface in contact with the concrete, including provision of block-outs, chamfered edges, notching, and overlaps, necessary greasing and/or coating with form oil, all necessary hardware, fixing accessories, scaffolding, shoring, and staging.

7. Supply of materials labor tools and equipment for the placing of concrete including necessary grouting, vibrating, hammering, tamping, consolidating, curing, hardening, wetting, sealing, brooming and scratching, protecting, sampling, provision of necessary extended chutes, and mixing boards usage of equipment and tools.

8. Supply of materials, labor, tools and equipment for the installation of Aluminum with rubber stair nosing including all fixing accessories and hardware, usage of tools and equipment to complete the work, location as described on plans and specifications.

9. Supply of labor, materials, tools and equipment for the fabrication and installation of Solid Aluminum Doors with door jamb and Aluminum glass window in Analok aluminum framing with tempered glass panels including all fixing accessories and hardware, usage of tools and equipment to complete the work, location as described on plans and specifications.

10. Supply of materials, labor, tools and equipment for the fabrication and installation of Stainless-Steel Railings at Main Stairs, Platform Railings, Ladder Rung using stainless pipe/steel top rail, intermediate horizontal rail and vertical post rail, Solar Panel Framing using strut channel and Beacon Pedestal fully welded including all fixing accessories and hardware, usage of tools and equipment to complete the work, location as described on plans and specifications.

11. Supply of labor, materials, tools and equipment for the fabrication and installation of Beacon House Framing, Roofing Sheets and Beacon fixed window including all other materials accessories necessary to complete the works, location as described on plans and specifications.

12. Supply of labor, materials, tools and equipment for the installation/application of Waterproofing at Deck including all other materials accessories necessary to complete the works, location as described on plans and specifications.

13. Supply of labor, materials, tools and equipment for the installation of Lightning/Surge Arrester including all other materials accessories necessary to complete the works, location as described on plans and specifications.

14. Supply of labor, materials, and tools for General (3-coats) painting on all surfaces i.e. masonry and concrete surfaces, ceilings, baseboards, casing including metal / steel, and wood surfaces, including surface preparation, primer tools and its use and all necessary accessories to complete the work.

15. Clearing and cleaning of all areas affected during the implementations of the project.

16. Furnish pictures to Coast Guard Infrastructure Development Service (CGIDS) or email at cgids.operations@gmail.com for the construction of the project for monitoring purpose of the National Headquarters Philippine Coast Guard (NHPCG).

GENERAL NOTES:

1. This simplified scope of works and the specifications are prepared in a concise manner which intention is to save time and to simplify specifications elaborateness. All work covered in the contract shall be executed in the highest form of workmanship and quality.

2. The drawings and specifications are intended to explain each mutually, and anything shown or called for in one and not the other shall be executed as part of the contract as though both are shown and specified.

3. The contractor shall take all the precautionary measures for the protection of adjacent properties from injury, damage or loss arising in connection with this contract. He shall be responsible for all damages to person and property, which may occur with the prosecution of work.

4. The contractor shall be in close coordination with the Philippine Coast Guard Technical Representatives (Coast Guard Infrastructure Development Service) on matters pertaining to engineering works. Any changes in work and materials shall be approved by the authorized representative and shall be to the advantage of the Philippine Coast Guard.

5. All works, materials and undertakings found necessary during the course of the construction shall be executed for the satisfactorily completion of the project, and shall be subject to general conditions and inspection before proper installation.

6. All permits, fees, inspections, material testing, and commissioning necessary for the satisfactorily completion of the project shall be done at the expense of the contractor.

7. Submission of complete five (5) sets of as-built plans of the project, signed and sealed, indicating all measurements and details. Warranties and test results shall also be submitted in five (5) copies for all installed materials. Liability period (2-years) shall take effect upon actual acceptance of the completed project.

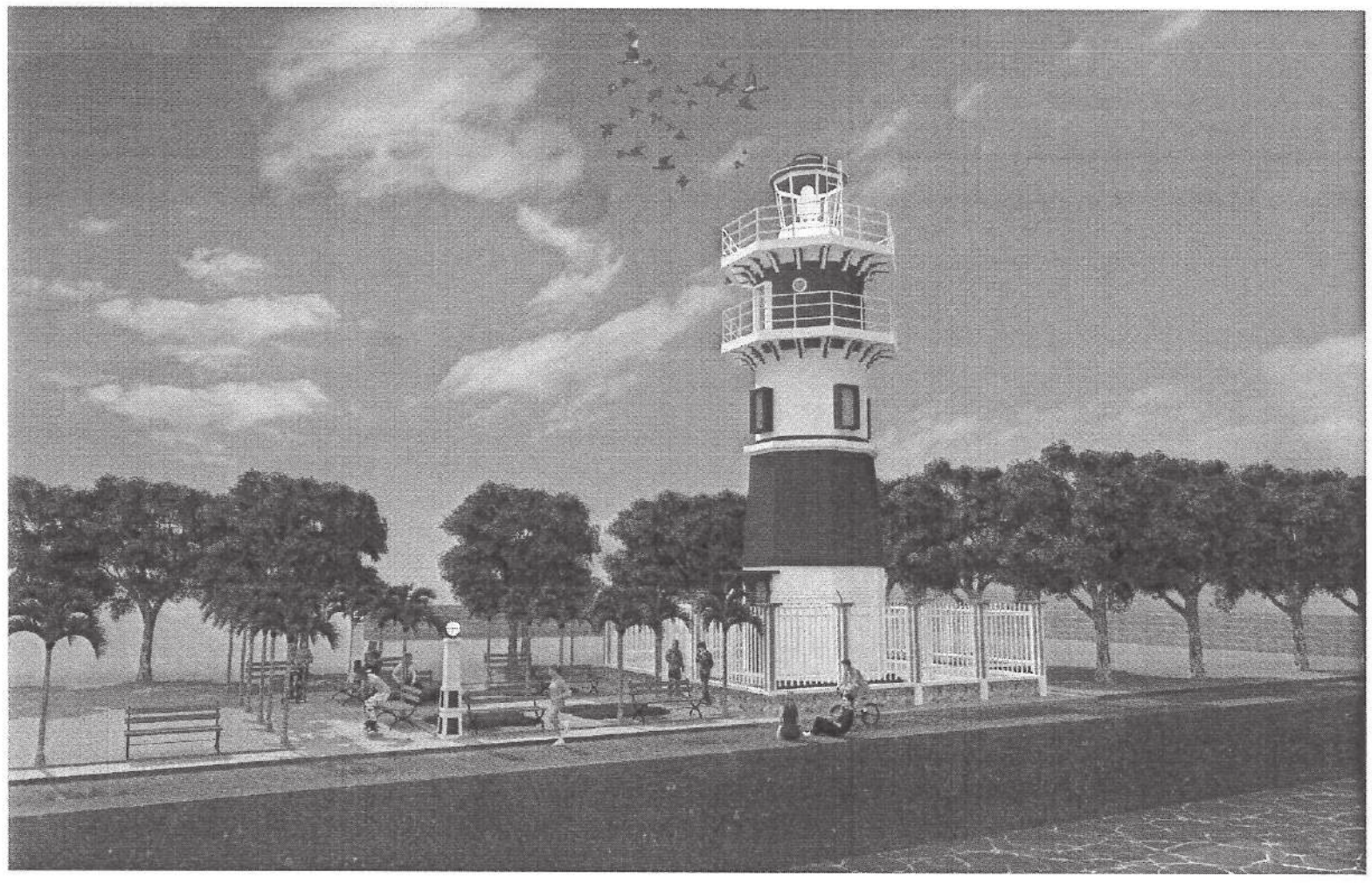
8. The contractor shall undertake/furnish all the necessary items, materials, tools, equipment, labor, plants, appliances, methods and all operations that may be needed and other incidentals for the satisfactorily completion of the **CONSTRUCTION OF COAST GUARD LIGHT STATION CONRADA.**

PHILIPPINE COAST GUARD

HEADQUARTERS COAST GUARD LOGISTICS SYSTEMS COMMAND

COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

CGBF, MUELLE DE LA INDUSTRIA, FAROLA COMPOUND BINONDO, 1006 MANILA

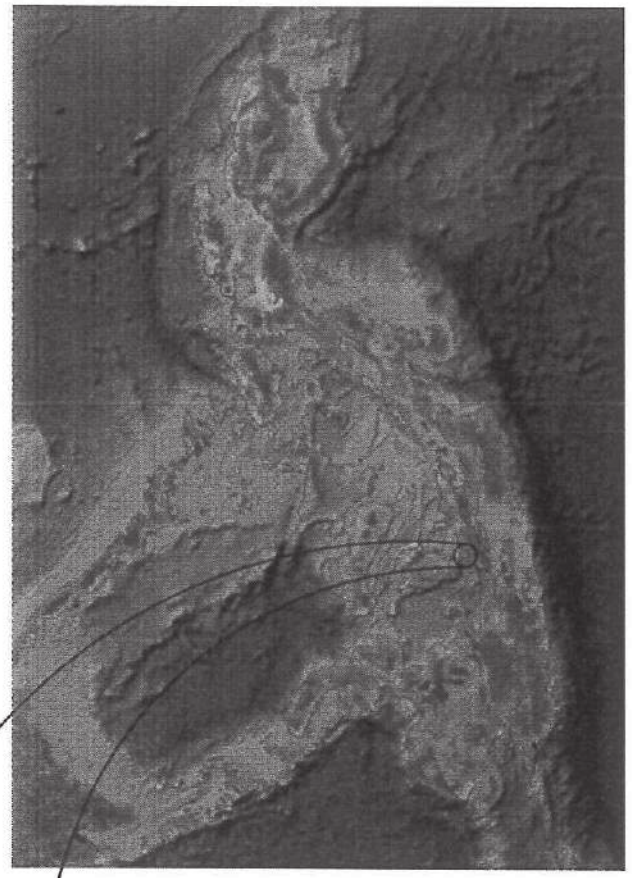


CONSTRUCTION OF COAST GUARD LIGHT STATION CONRADA

BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE

PREPARED BY:	CHECKED AND SUBMITTED BY:	RECOMMEDED BY:	APPROVED BY:
ENGR JOSEPHINE MARIE B TRINIDAD, CE Engineer III	CG LTJG ROMMEL O FAGARANG Asst Head, Planning, Programming and Design Division	ENGR HILARIO A ADAYA, REE Engineer IV	CG COMMO PRUDENCIO C PATRICIO JR Commander, CGIDS

T A B L E O F C O N T E N T S



CG LIGHT STATION CONRADA
A C 1 LOCATION MAP
SCALE NTS

COAST GUARD LIGHT STATION CONRADA

A. SITE AND GROUND DEVELOPMENT

SHEET NO.	SHEET CONTENT
C - 1	LOCATION MAP TABLE OF CONTENTS
C - 2	VICINITY MAP SITE DEVELOPMENT PLAN PERIMETER FENCE LAYOUT PERIMETER FENCE FOUNDATION PLAN
C - 3	PERIMETER FENCE AND GATE LAYOUT FRONT FENCE AND GATE ELEVATION PERIMETER FENCE ELEVATION GATE ELEVATION SPOT DETAILS

B. LIGHT STATION

SHEET NO.	SHEET CONTENT
A - 1	PERSPECTIVE LOCATION MAP
A - 2	LIGHTSTATION FLOOR PLAN
A - 3	FRONT ELEVATION REAR ELEVATION
A - 4	CROSS SECTION
A - 5	DOORS AND WINDOWS SCHEDULE
A - 6	CORBEL DETAILS
A - 7	SPOT DETAILS STEEL RAILING DETAILS INTERIOR STEEL RAILING DETAILS INTERIOR STEEL LADDER RUNG DETAILS
A - 8	SOLAR PANEL FRAMING DETAILS
A - 9	SOLAR PANEL FRAMING DETAILS
A - 10	BEACON FRAMING DETAILS
A - 11	BEACON SECTION BEACON PLATFORM DETAILS BEACON WINDOW SCHEDULE
A - 12	BEACON BLOW UP DETAILS
S - 1	GENERAL CONSTRUCTION NOTES
S - 2	GENERAL CONSTRUCTION NOTES
S - 3	LIGHTHOUSE FOUNDATION PLAN MAT-1 FOOTING DETAILS STAIR ON FILL DETAILS
S - 4	LIGHTHOUSE FRAMING PLAN
S - 5	TYP. SLAB ELEVATION DETAIL SLAB SCHEDULE TYP. BEAM ELEVATION DETAIL BEAM SCHEDULE STAIR DETAILS

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
139 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER : PHILIPPINE COAST GUARD

PREPARED BY: Engr Josephine Marie B Trinidad, CE, Engineer III

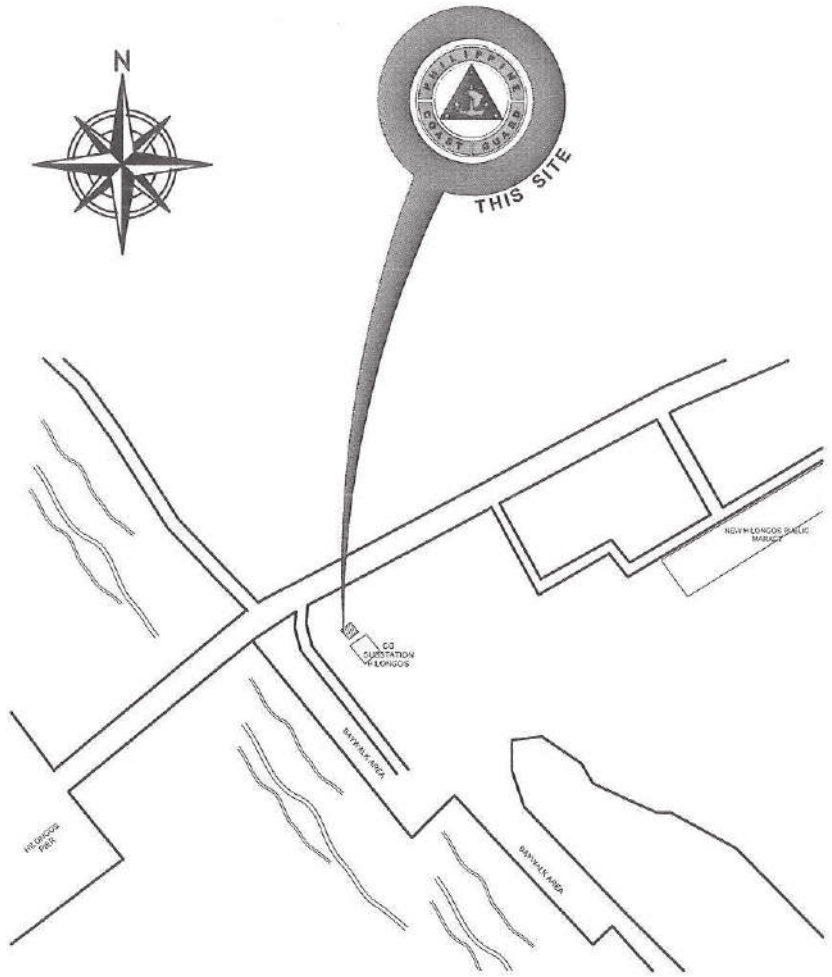
REVISION | DATE

CHECKED BY: CG LTJG ROMMEL O FAGARANG, Asst Head, Planning, Programming and Design Division

RECOMMENDING APPROVAL: ENGR HILARIO A ADAYA, REE, Engineer IV

APPROVED BY: CG COMMO PRUDENCIO G PATRICIO JR, Commander, CGIDS

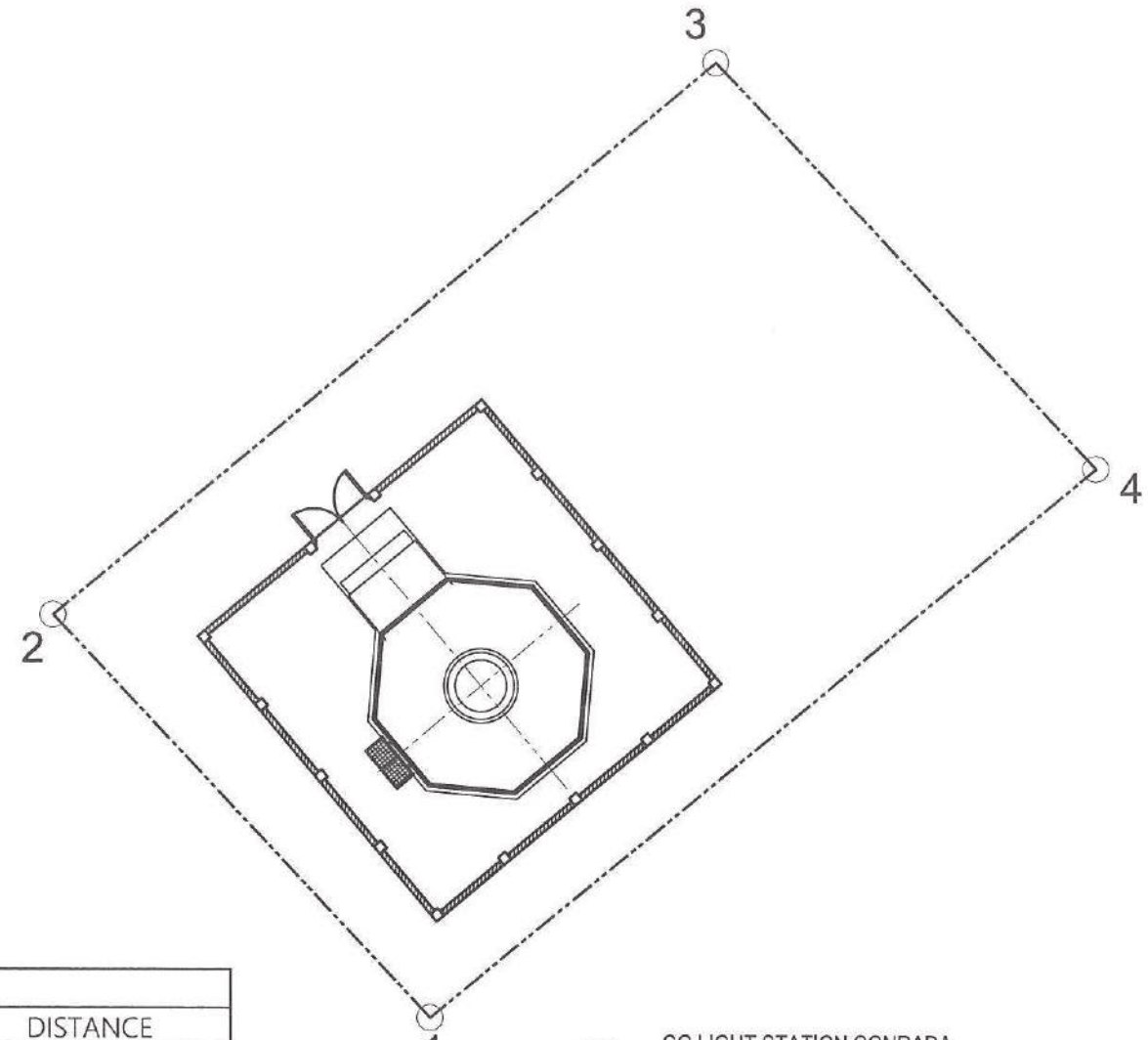
SHEET NO. 1 / 3



CG LIGHT STATION CONRADA

A C 2 VICINITY MAP

SCALE NTS

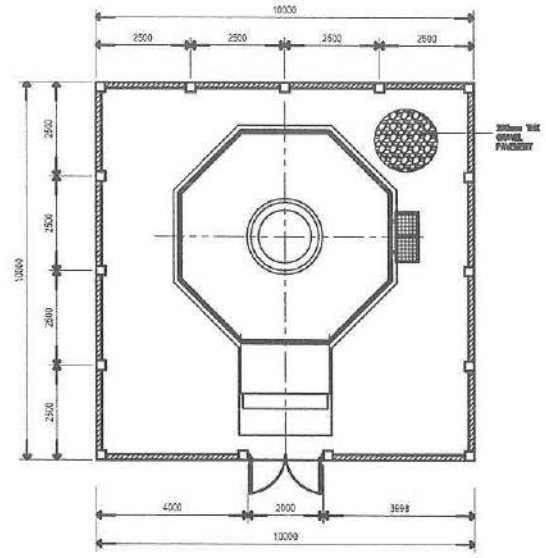


DESCRIPTION		
CORNER	BEARING	DISTANCE
1-2	N 43° 3' W	15.10m
2-3	N 50° 4' W	23.31m
3-4	S 43° 2' E	15.00m
4-1	S 50°27' W	23.30m
TOTAL		347.00sq.m.

CG LIGHT STATION CONRADA

B C 2 SITE DEVELOPMENT PLAN

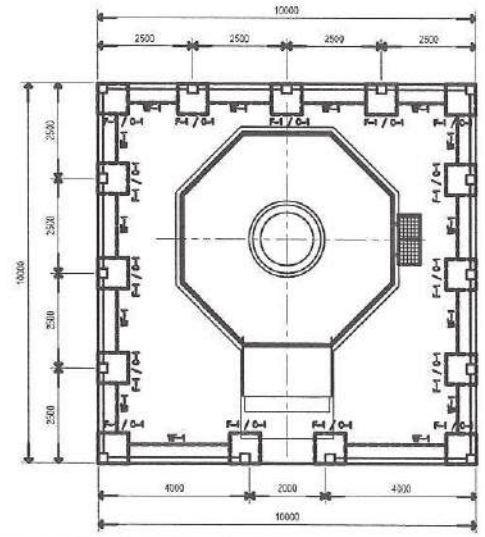
SCALE 1:200M



CG LIGHT STATION CONRADA

C C 2 PERIMETER FENCE LAYOUT

SCALE 1:200M



CG LIGHT STATION CONRADA

D C 2 PERIMETER FENCE FOUNDATION PLAN

SCALE 1:200M

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
139 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER : PHILIPPINE COAST GUARD

PREPARED BY: Engr Josephine Marie B Trinidad, CE, Engineer III

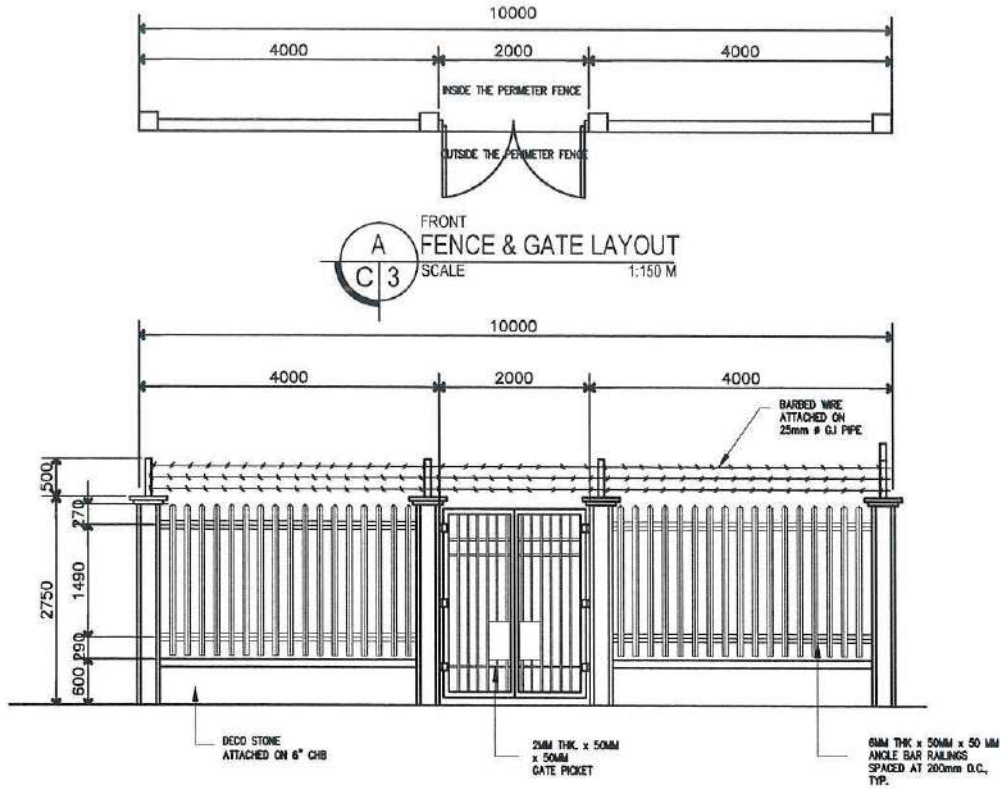
REVISION | DATE

CHECKED BY: CG LTJG ROMMEL O FAGARANG, Asst Head, Planning, Programming and Design Division

RECOMMENDING APPROVAL: ENGR HILARIO A ADAYA, REE, Engineer IV

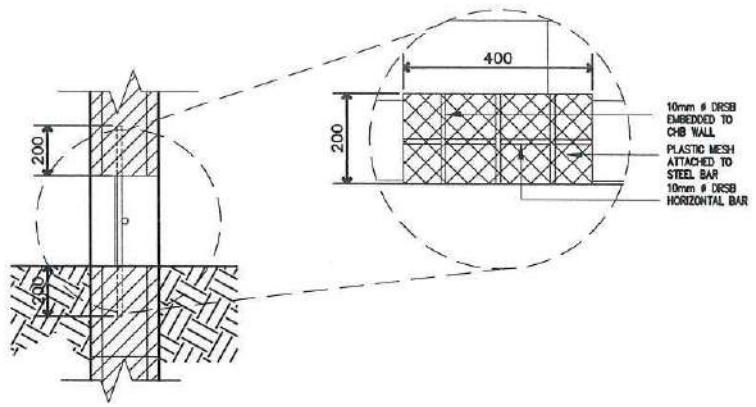
APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

SHEET NO. 2/4

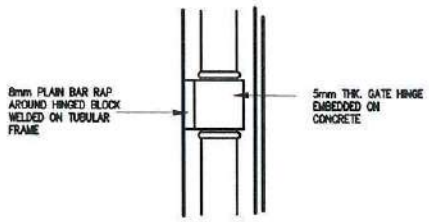


FRONT
A / C 3 FENCE & GATE LAYOUT
SCALE 1:150 M

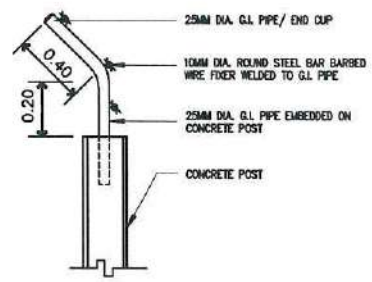
FRONT
B / C 3 FENCE & GATE ELEVATION
SCALE 1:100 M



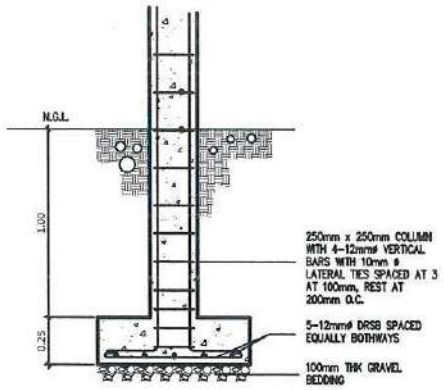
DRAIN
E / C 3 SPOT DETAIL
SCALE NTS

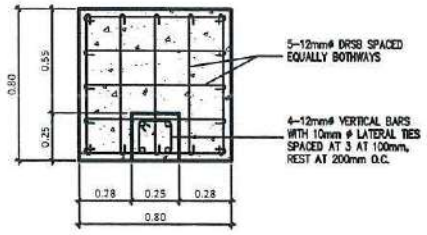


GATE HINGE
F / C 3 SPOT DETAIL
SCALE NTS

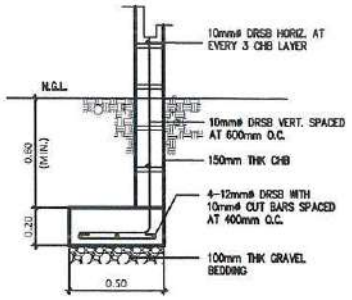


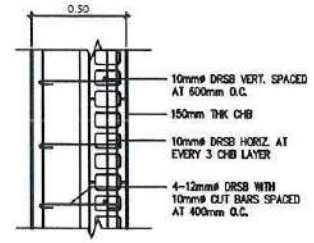
DETAIL OF G.I PIPE
H / C 3 EMBEDDED ON CONC POST
SCALE NTS



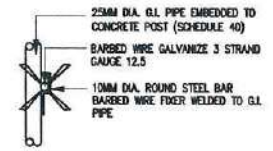


FENCE
C / C 3 F-1 / C-1 DETAIL
SCALE NTS

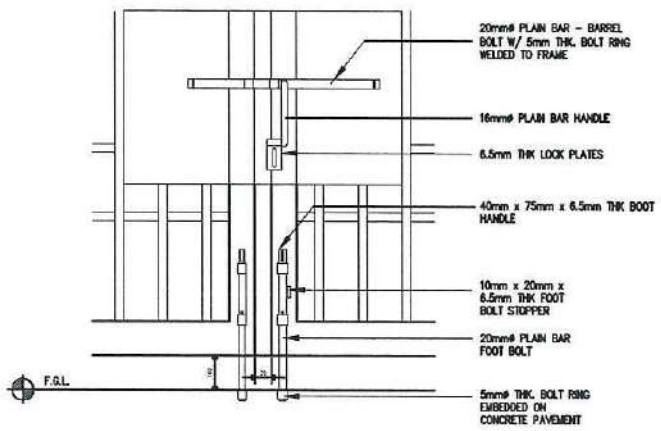




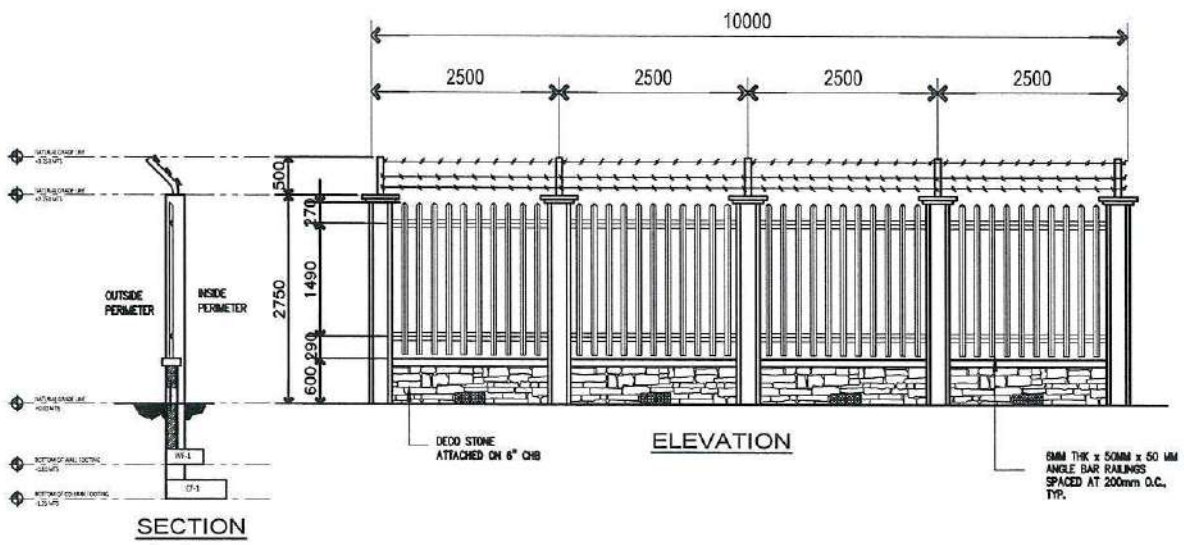
FENCE
D / C 3 WF-1 DETAIL
SCALE NTS



DETAIL OF BARBED WIRE
G / C 3 FIXED WELDED TO G.I PIPE
SCALE NTS



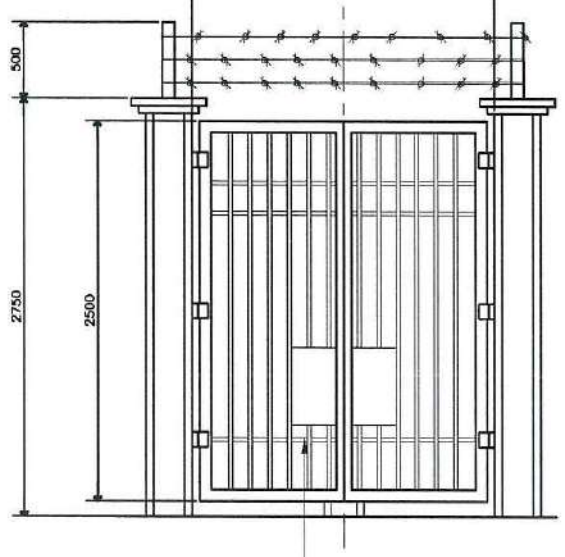
BARREL BOLT & FOOT BOLT
J / C 3 SPOT DETAIL
SCALE NTS



SECTION

ELEVATION

PERIMETER FENCE ELEVATION
I / C 3
SCALE 1:100 M



BACK DETAIL OF
K / C 3 GATE ELEVATION
SCALE 1:25M

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
139 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE	CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION	BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER	PHILIPPINE COAST GUARD

PREPARED BY: CG ASW Kathlyn C Bello, Member, Architectural Branch

CHECKED BY: CG ENS JOHN PATRICK E FERRE, OIC, Architectural Branch

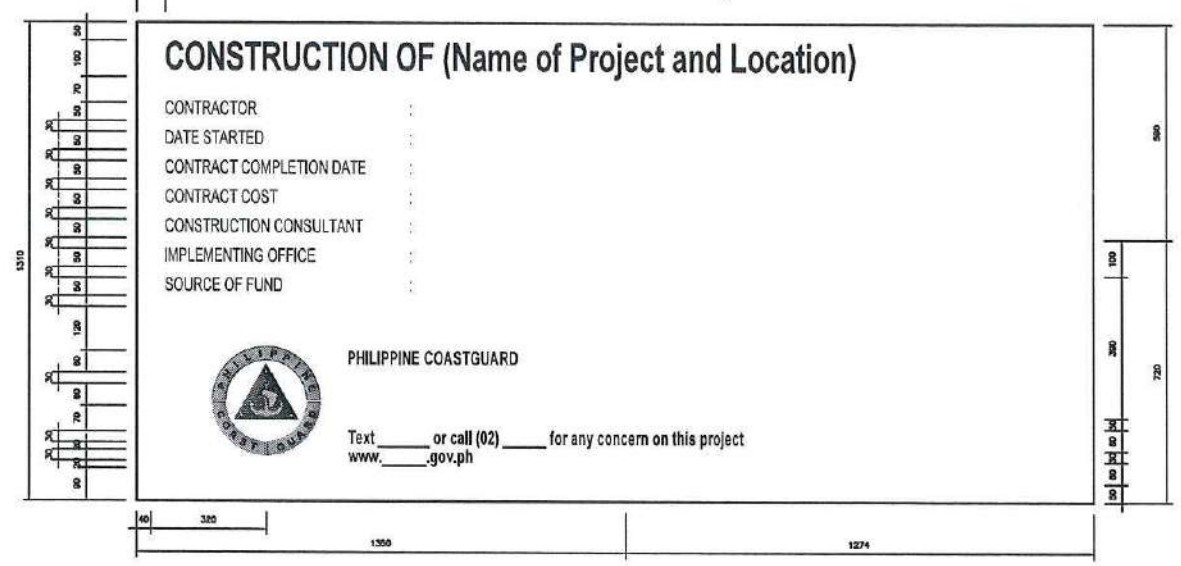
RECOMMENDING APPROVAL: CG CAPT JOHN A BARRAMEDA (GSC), Deputy Commander

APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

REVISION | DATE

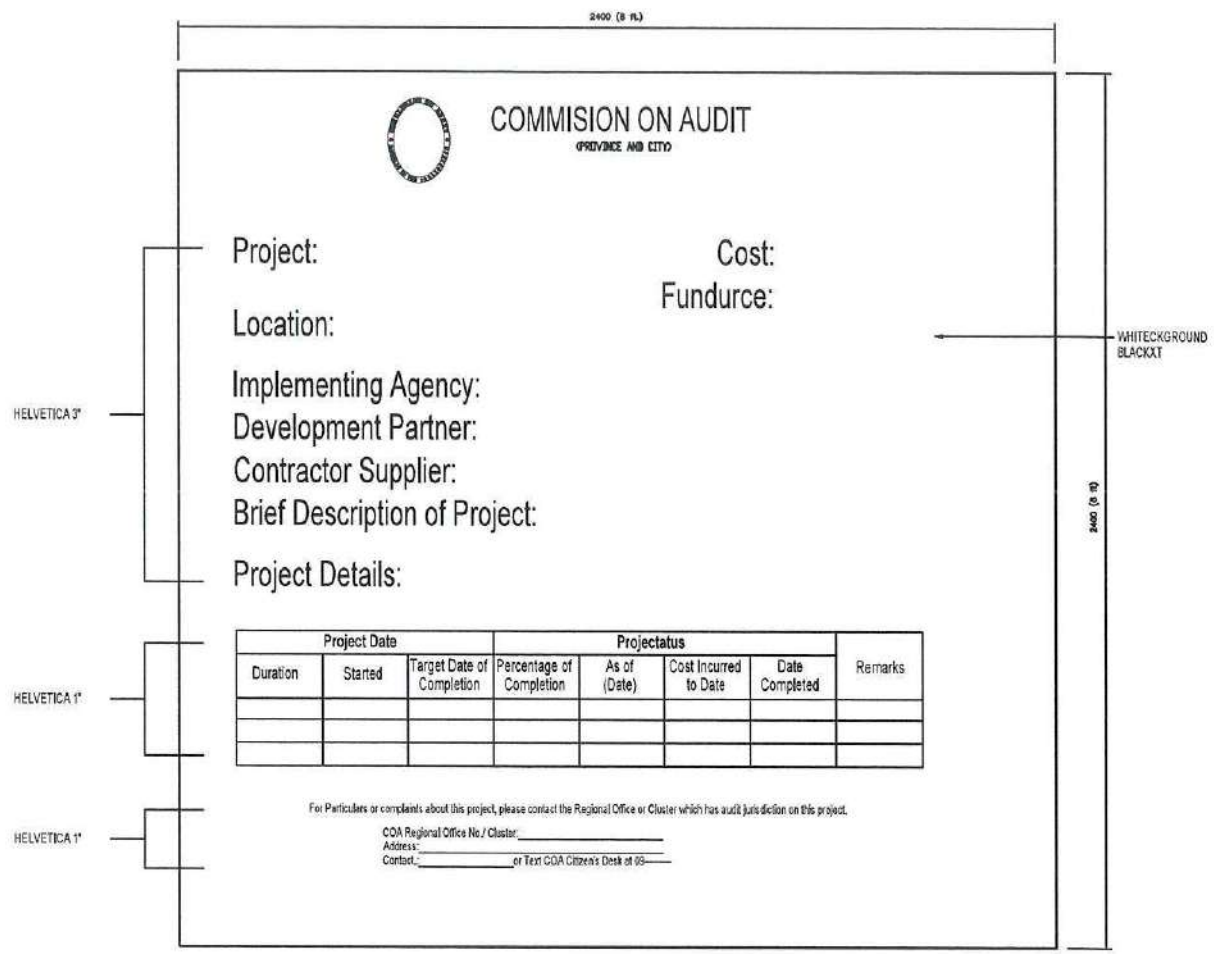
SHEET NO. 3 / 3

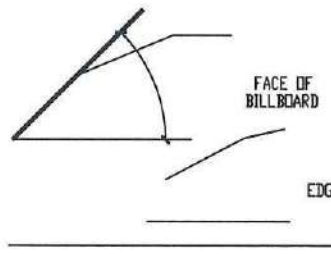
NOTE: THE EXPENSES INCURRED IN THE INSTALLATION OF BILLBOARD IS INCLUDED IN THE DCM PER DO. 12, SERIES 2011

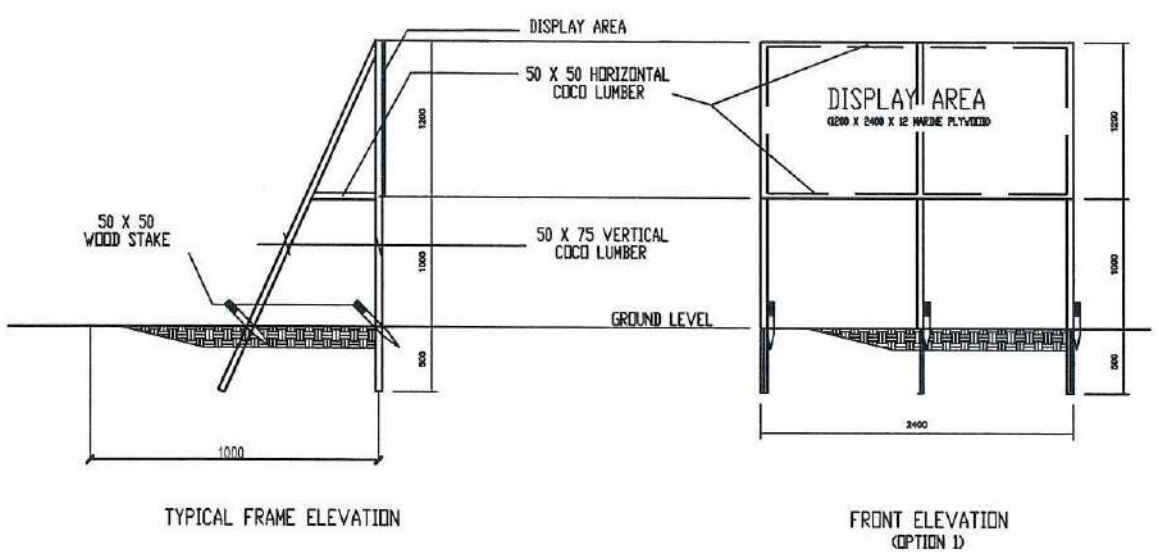


SCALE 1:10 M

NOTE :
For Source of Fund, _____

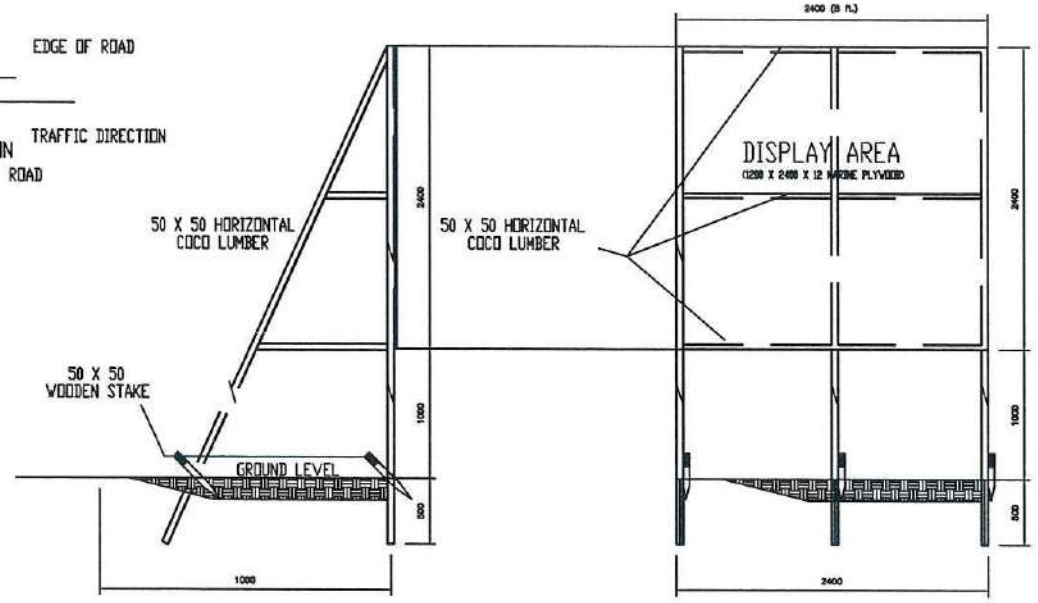






TYPICAL FRAME ELEVATION

FRONT ELEVATION
(OPTION 1)



TYPICAL FRAME ELEVATION

FRONT ELEVATION

SCALE 1: 25 M.

STANDARD PROJECT BILLBOARD

(PHILIPPINE COASTGUARD)

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
139 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER : PHILIPPINE COAST GUARD

PREPARED BY:
CG ASW Kathlyn C Bello
POIC, Architectural Branch

REVISION | DATE

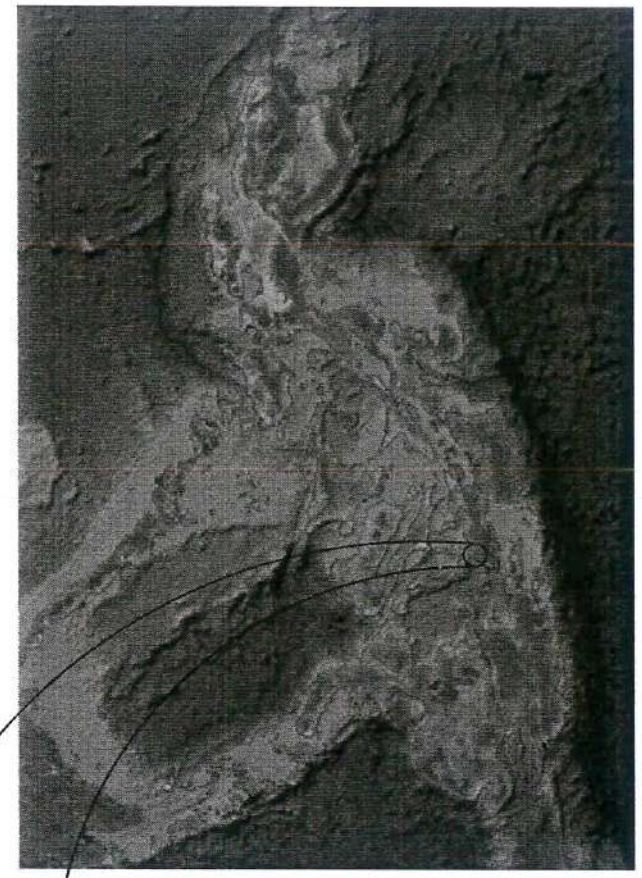
CHECKED BY:
CG ENS JOHN PATRICK E FERRE
CHG, Architectural Branch

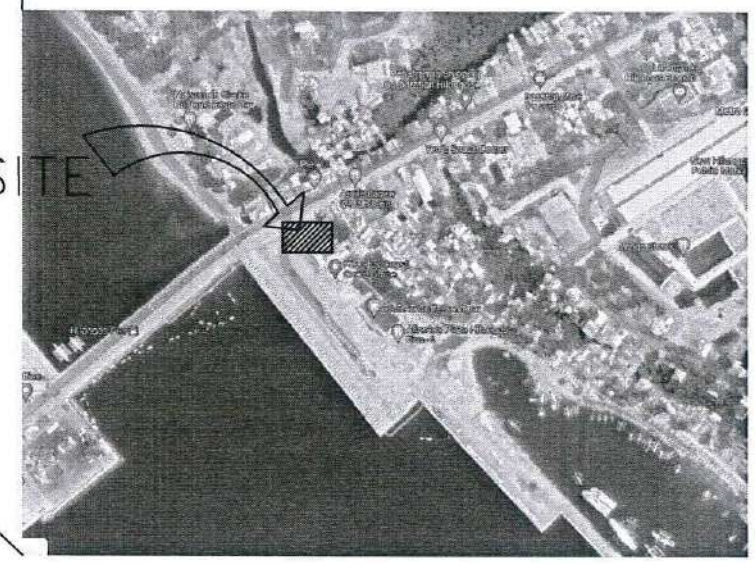
RECOMMENDING APPROVAL:
CG CAPT JOHN A BARRAMEDA (GSC)
Deputy Commander

APPROVED BY:
CG COMMO PRUDENCIO G PATRICIO JR
Commander, CGIDS

SHEET NO. 1 / 1

A1 — CG LIGHT STATION CONRADA
PERSPECTIVE
SCALE NTS





B — CG LIGHT STATION CONRADA
LOCATION MAP
SCALE NTS

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE	CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION	BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER	PHILIPPINE COAST GUARD

PREPARED BY: CG CPO Eduardo T Valle, CMAA, Architectural Branch

REVISION | DATE

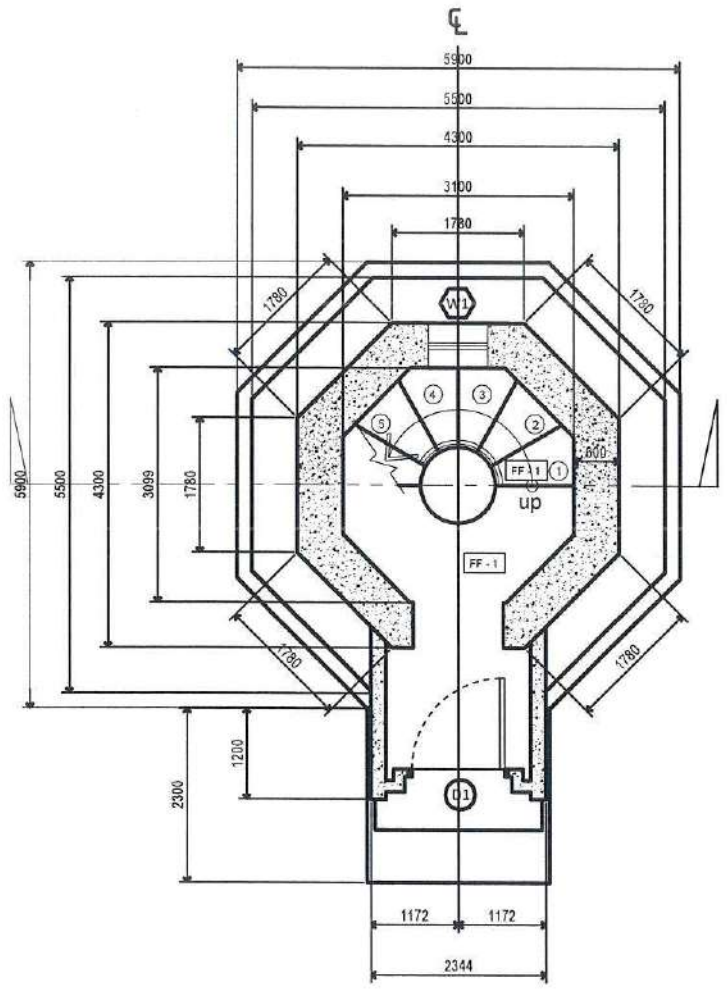
CHECKED BY: CG ENS JOHN PATRICK E FERRE, OIC, Architectural Branch

RECOMMENDING APPROVAL: CG CAPT JOHN A BARRAMEDA (GSC), Deputy Commander

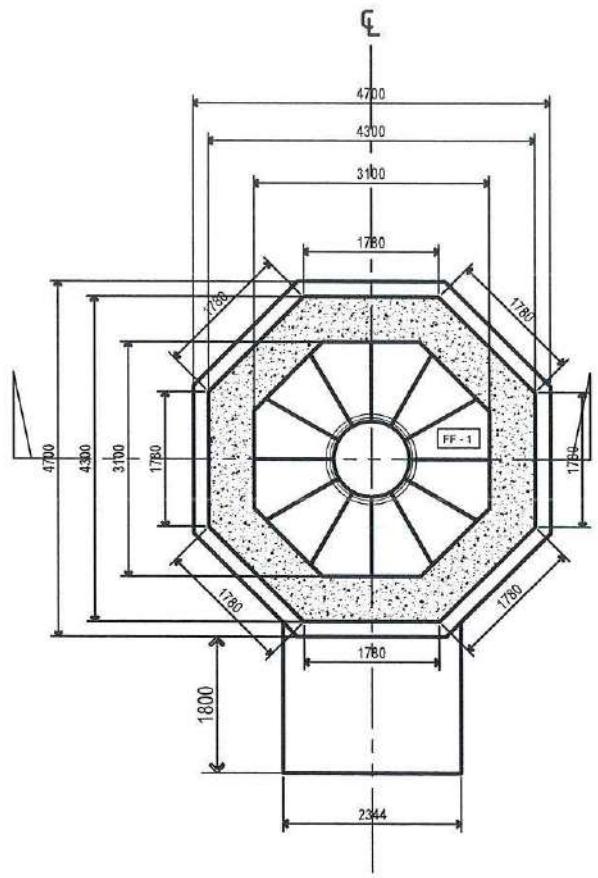
APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

SHEET NO. 1/12

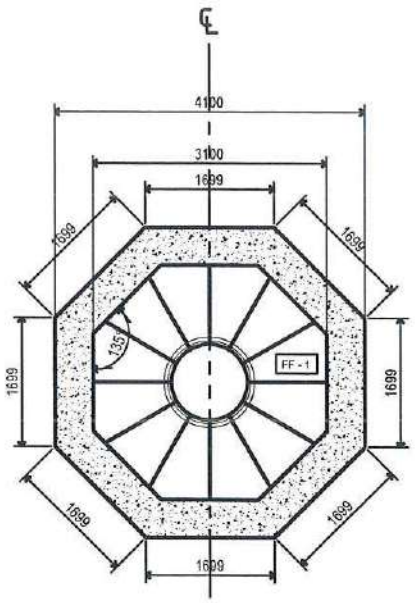
FLOOR FINISHES	
CODE	DESCRIPTION
FF-1	PLAIN CEMENT FINISH
FF-2	PLAIN CEMENT FINISH, CEMENTITIOUS WATERPROOFING



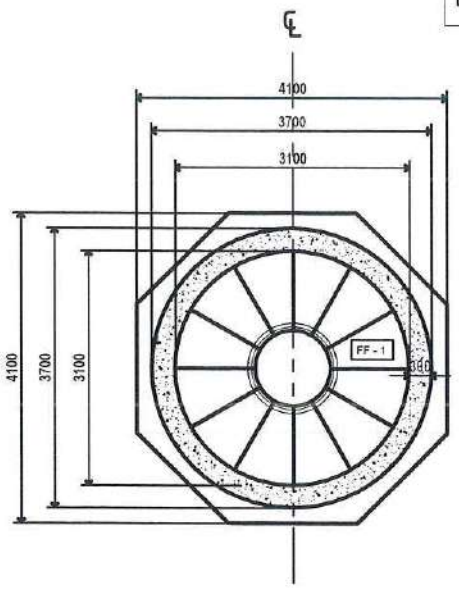
LEVEL 1 PLAN



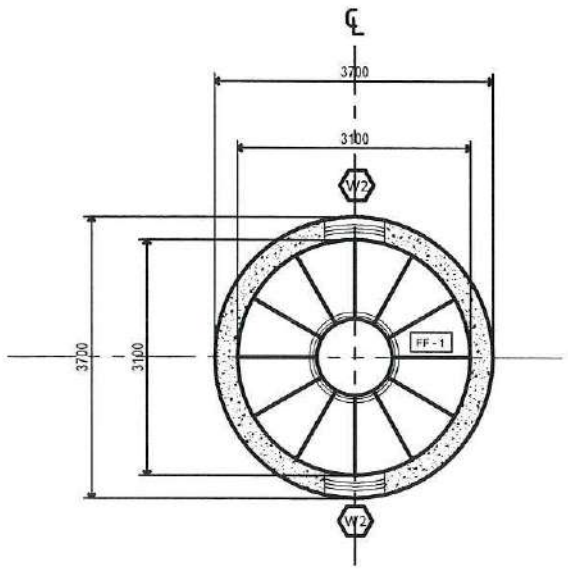
LEVEL 2 PLAN



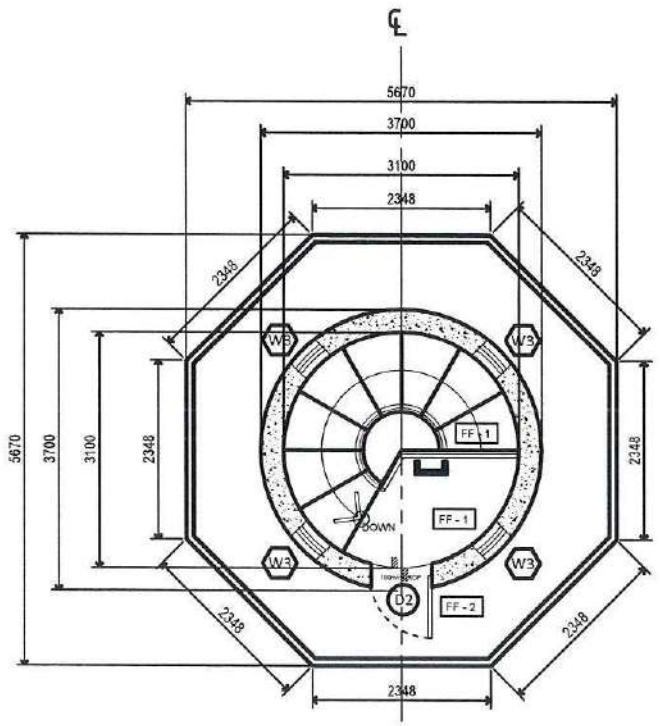
LEVEL 3 PLAN



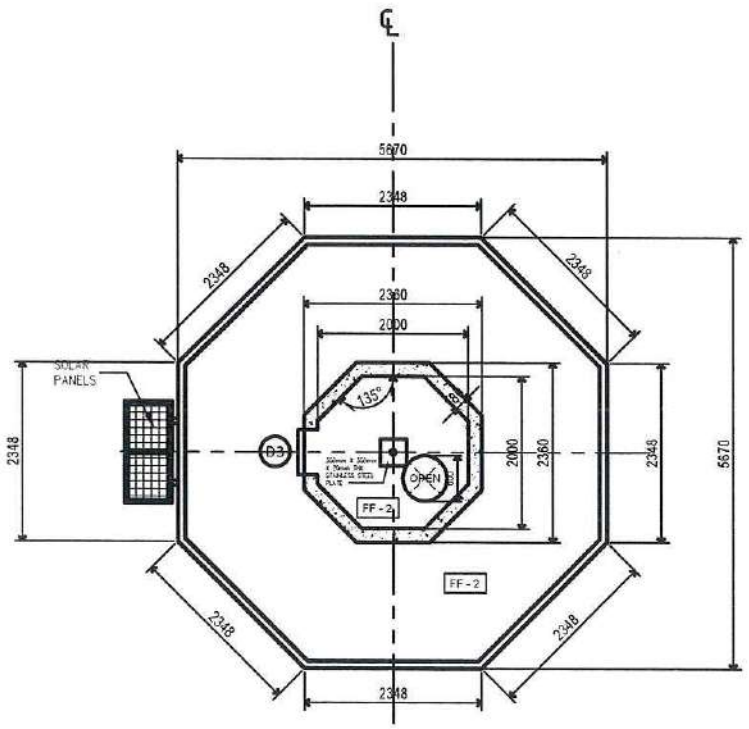
LEVEL 4 PLAN



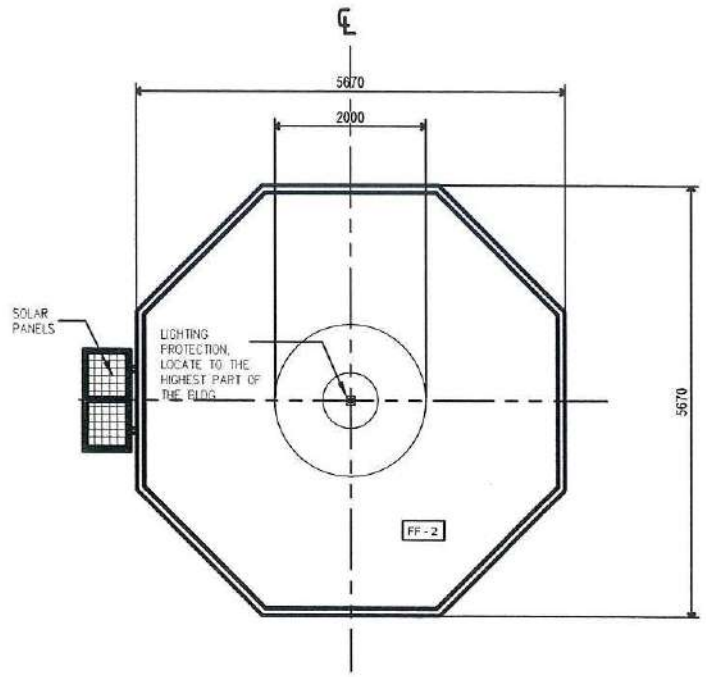
LEVEL 5 PLAN



LEVEL 6 PLAN



LEVEL 7 PLAN



LEVEL 8 PLAN

A
A 2

CG LIGHT STATION CONRADA
FLOOR PLAN
SCALE 1:100M

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST., PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER : PHILIPPINE COAST GUARD

PREPARED BY: CG CPO Orlando T Valle, CMAA, Architectural Branch

REVISION | DATE

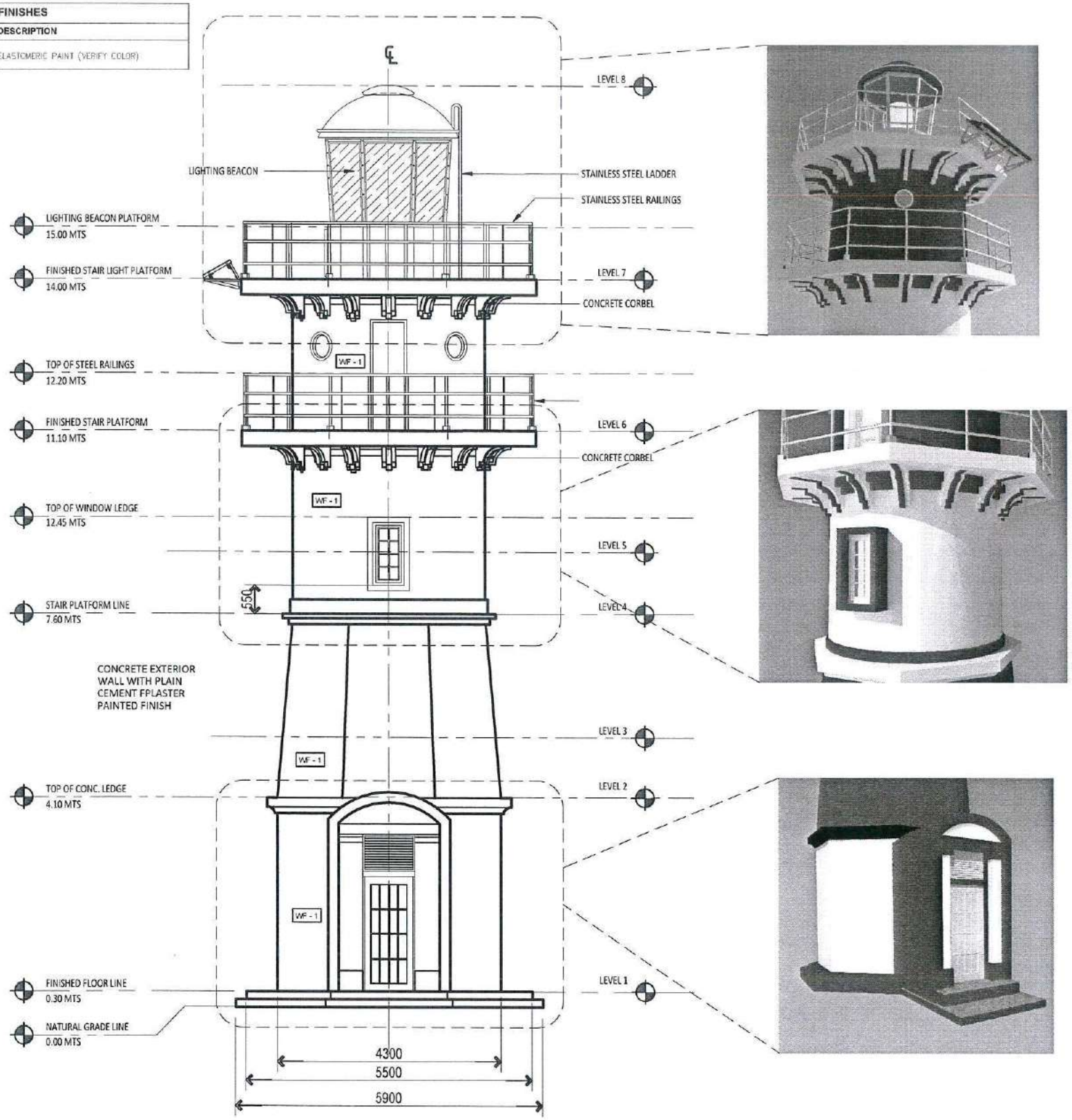
CHECKED BY: CG ENS JOHN PATRICK E FERRE, CIC, Architectural Branch

RECOMMENDING APPROVAL: CG CAPT JOHN A BARRAMEDA (GSC), Deputy Commander

APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

SHEET NO. 2 / 12

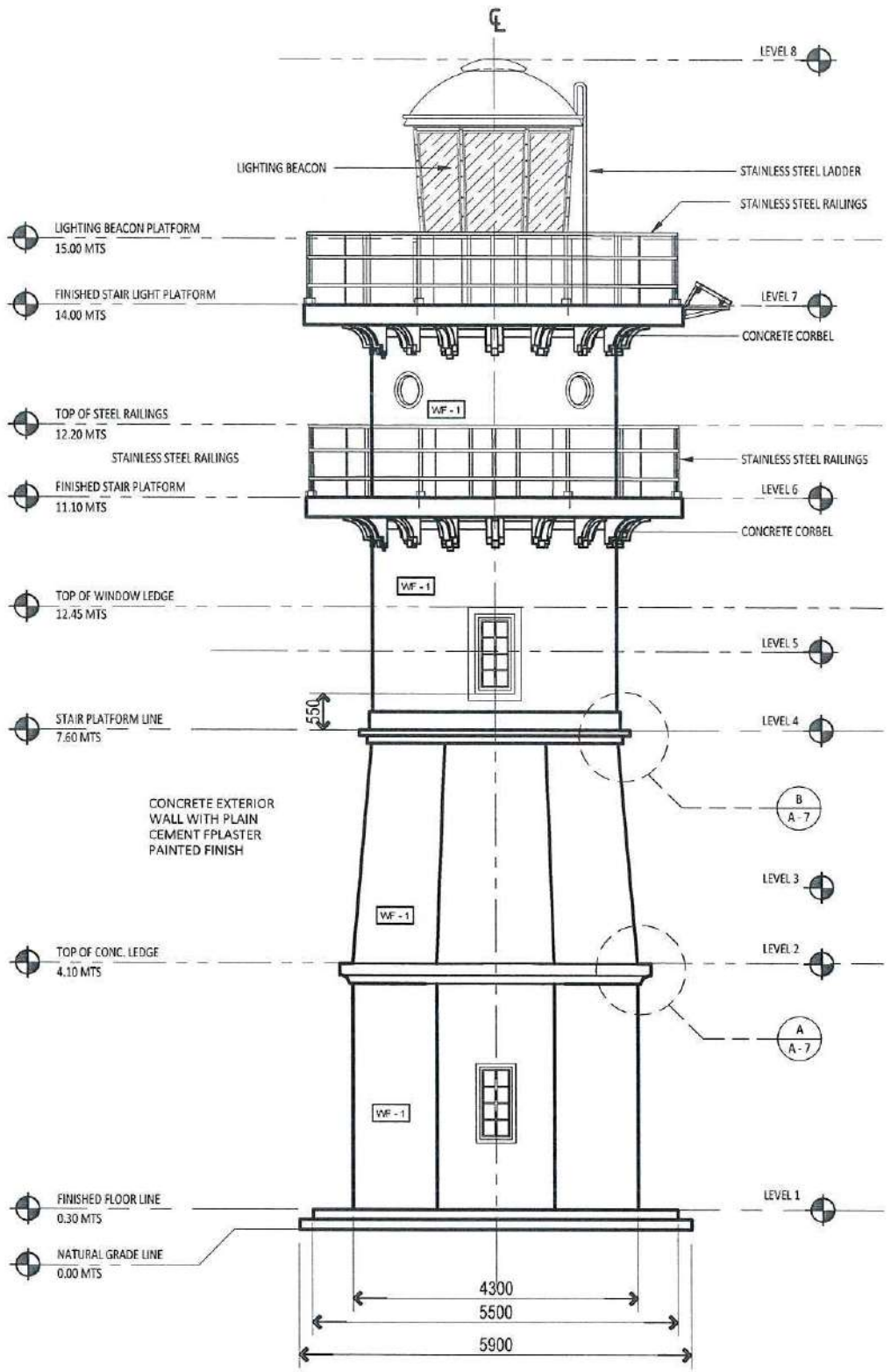
WALL FINISHES	
CODE	DESCRIPTION
WF-1	ELASTOMERIC PAINT (VERIFY COLOR)



CG LIGHT STATION CONRADA

A | A 3 **FRONT ELEVATION**

SCALE 1:100M



CG LIGHT STATION CONRADA

B | A 3 **REAR ELEVATION**

SCALE 1:100M

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER : PHILIPPINE COAST GUARD

SHEET NO. 3 / 12

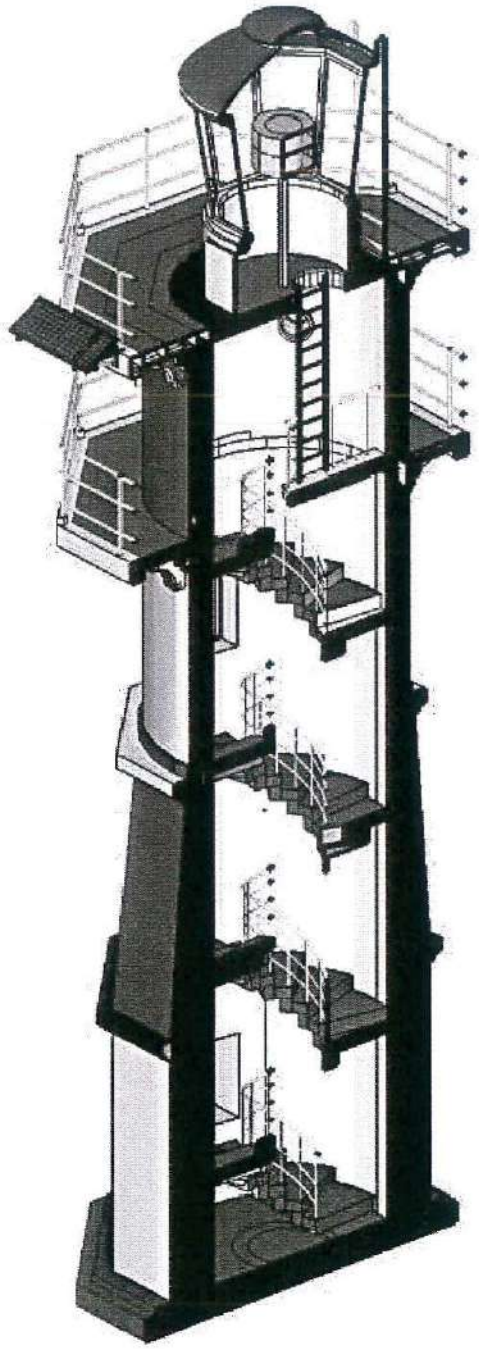
PREPARED BY:
CG SPS Orlando T Valle
CMAA, Architectural Branch

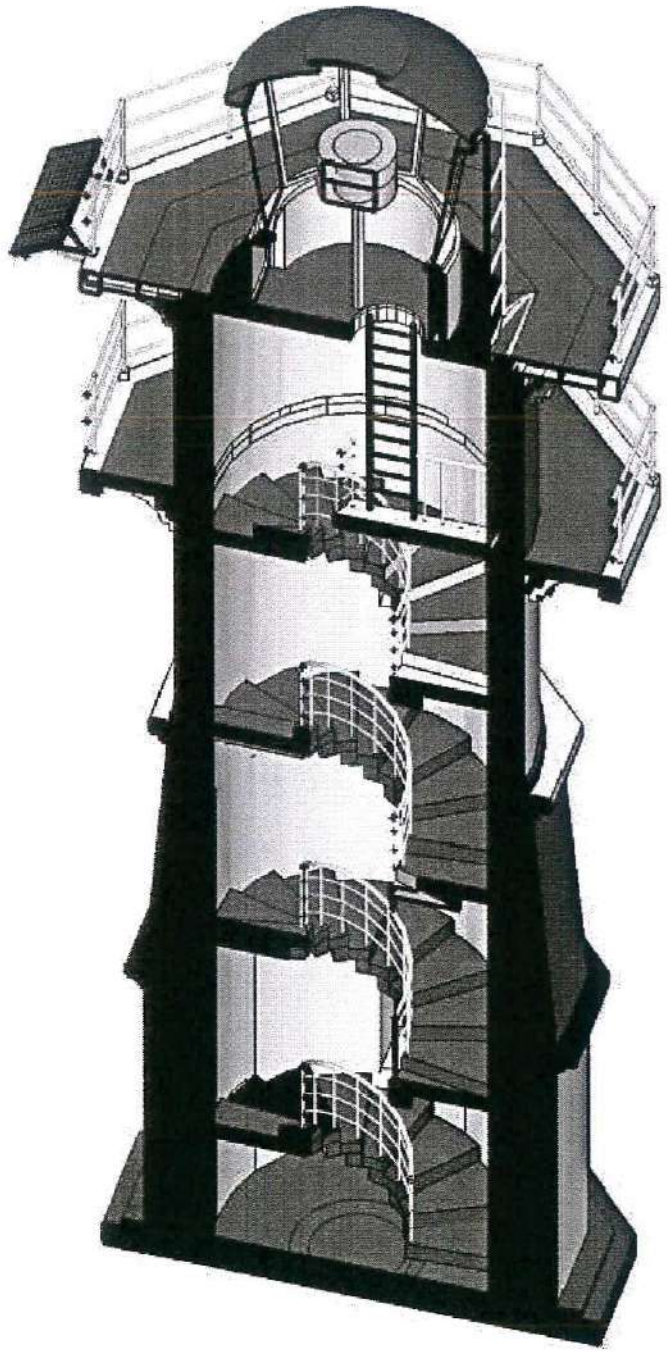
CHECKED BY:
CG ENS JOHN PATRICK E FERRE
OIC, Architectural Branch

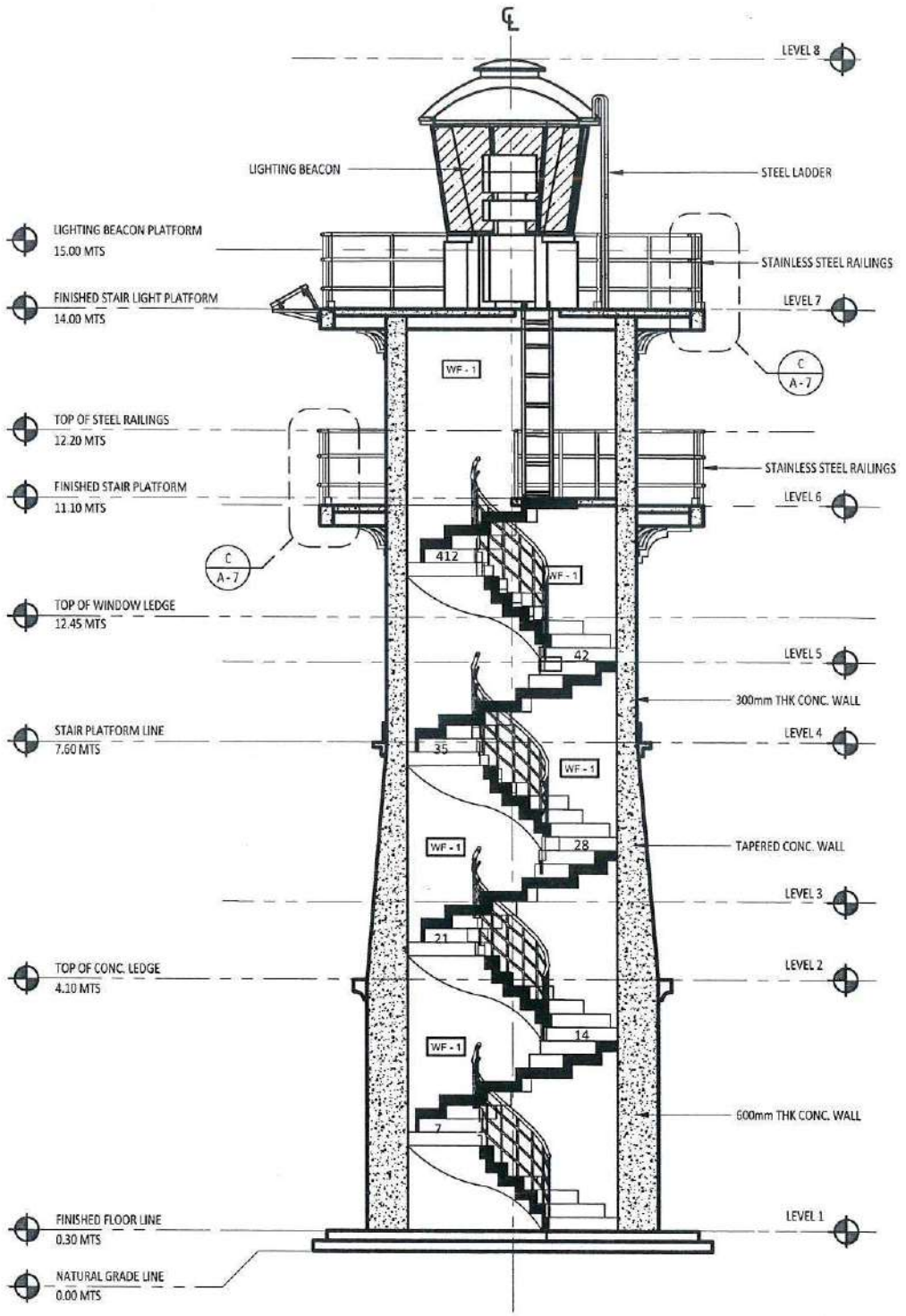
RECOMMENDING APPROVAL:
CG CAPT JOHN A BARRAMEDA (GSC)
Deputy Commander

APPROVED BY:
CG COMMO PRUDENCIO C PATRICIO JR
Commander, CGIDS

REVISION	DATE







A
A 4

CG LIGHT STATION CONRADA

CROSS SECTION

SCALE 1:100M

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE	CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION	BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER	PHILIPPINE COAST GUARD

SHEET NO. 4 / 12

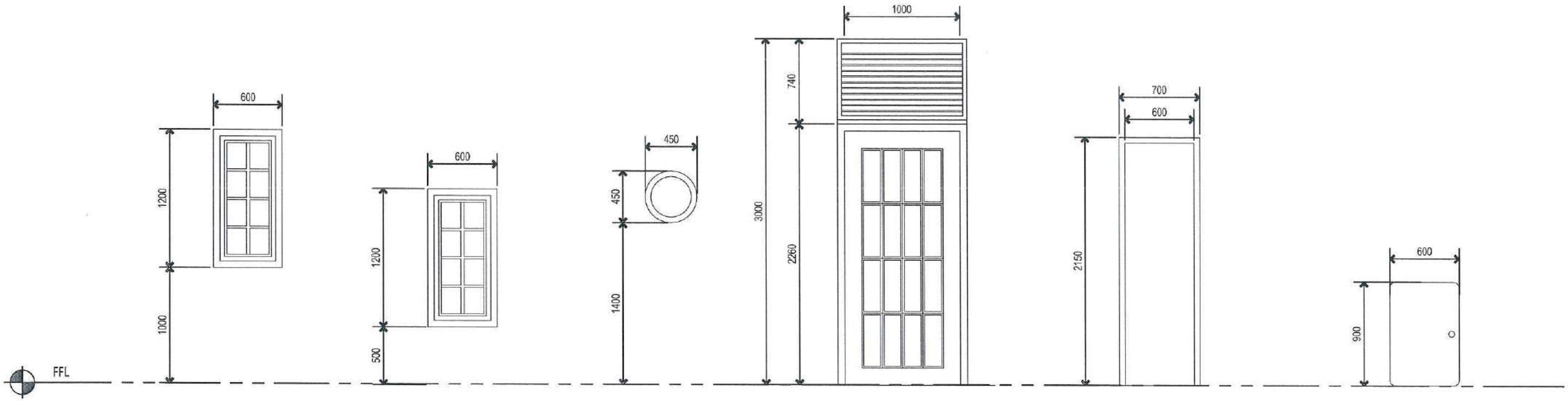
PREPARED BY:
CG CPO Orlando T Valle
CMAA, Architectural Branch

REVISION | DATE

CHECKED BY:
CG ENS JOHN PATRICK E FERRE
CIC, Architectural Branch

RECOMMENDING APPROVAL:
CG CAPT JOHN A BARRAMEDA (GSC)
Deputy Commander

APPROVED BY:
CG COMMO PRUDENCIO C PATRICIO JR
Commander, CGIDS



DESIGNATION	W1	W2	W3	D1	D2	D3
DESCRIPTION	ALUMINUM WINDOW WITH 1/4" THK GLASS AND COMPLETE HARDWARE	ALUMINUM WINDOW WITH 1/4" THK GLASS AND COMPLETE HARDWARE		SOLID ALUMINUM DOOR WITH COMPLETE ACCESSORIES	SOLID ALUMINUM DOOR WITH COMPLETE ACCESSORIES	SOLID ALUMINUM DOOR WITH COMPLETE ACCESSORIES
QUANTITY	ONE (1) SET	FOUR (4) SETS	FOUR (4) SETS	ONE (1) SET	ONE (1) SET	ONE (1) SET

A5 DOORS AND WINDOWS SCHEDULE
SCALE 1:100M

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST., PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS LETYE
OWNER : PHILIPPINE COAST GUARD

PREPARED BY:
CG CPO Orlando T Valle
CIMAA, Architectural Branch, CGIDS

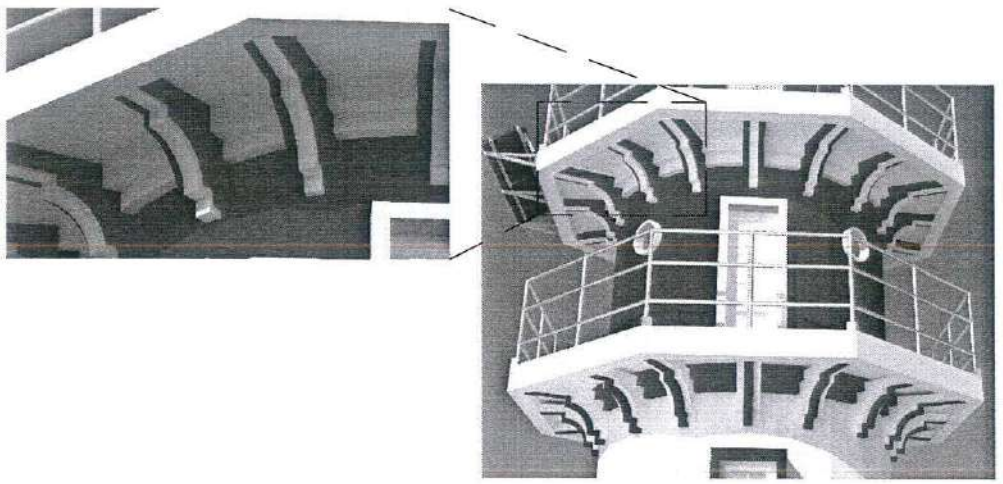
REVISION | DATE

CHECKED BY:
CG ENS JOHN PATRICK E FERRE
CIC, Architectural Branch, CGIDS

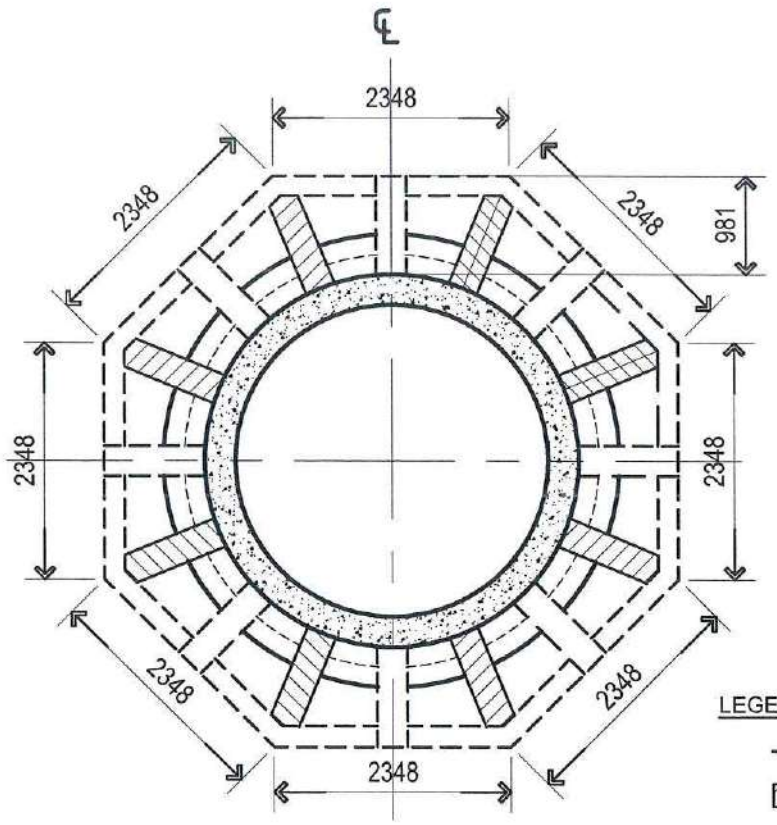
RECOMMENDING APPROVAL:
CG CAPT JOHN A BARRAMEDA (GSC)
Deputy Commander, CGIDS

APPROVED BY:
CG COMMO PRUDENCIO C PATRICIO JR
Commander, CGIDS

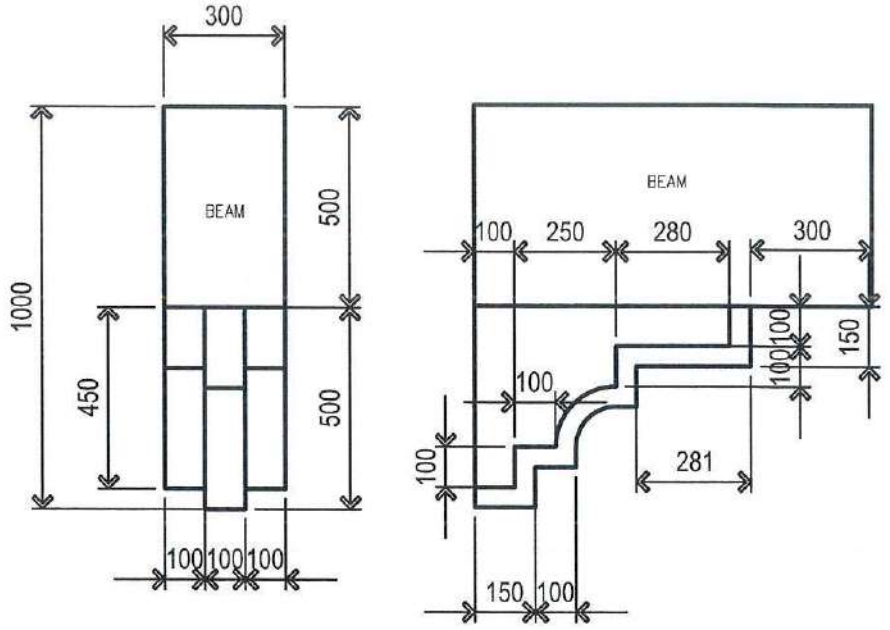
SHEET NO. 5 / 12



PERSPECTIVE



LEVEL 6 & 7 CONCRETE CORBEL PLAN

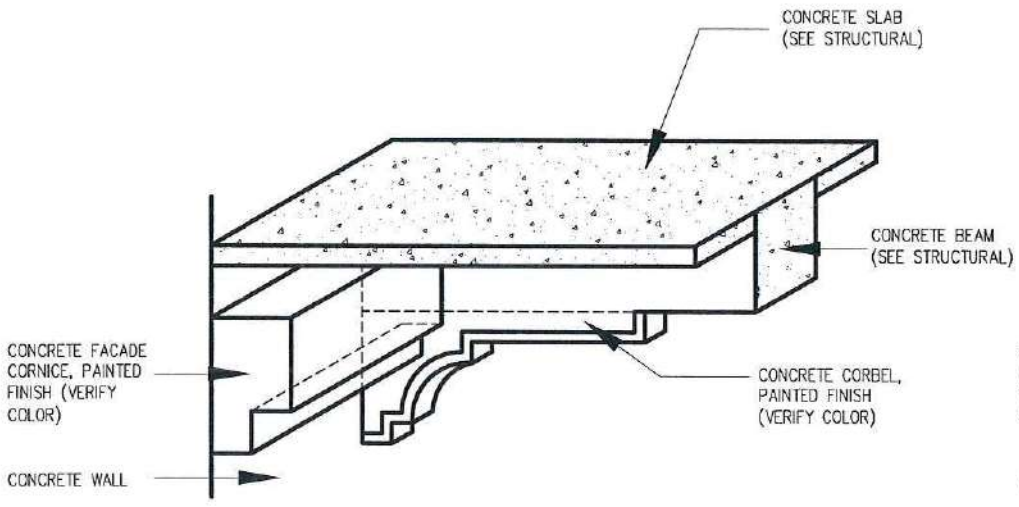


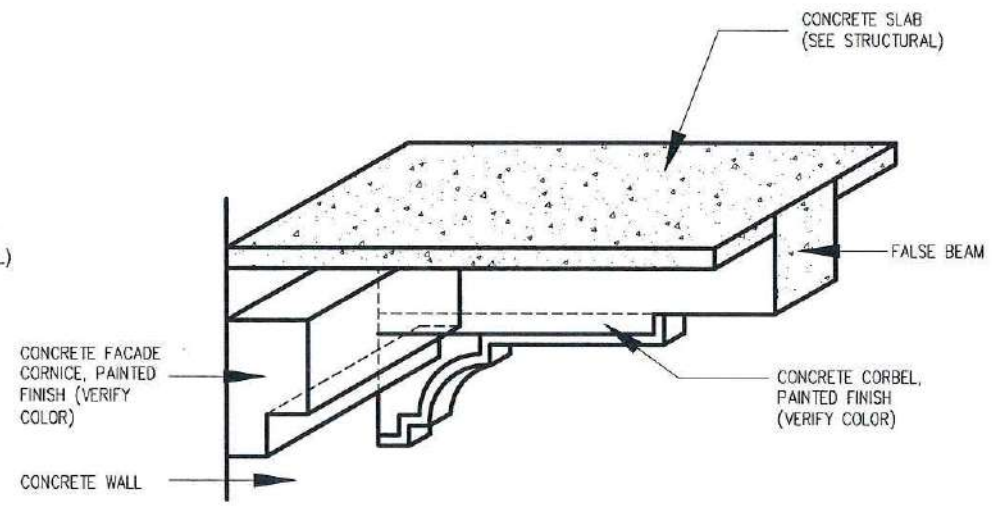
CONCRETE CORBEL DETAILS

LEGEND:

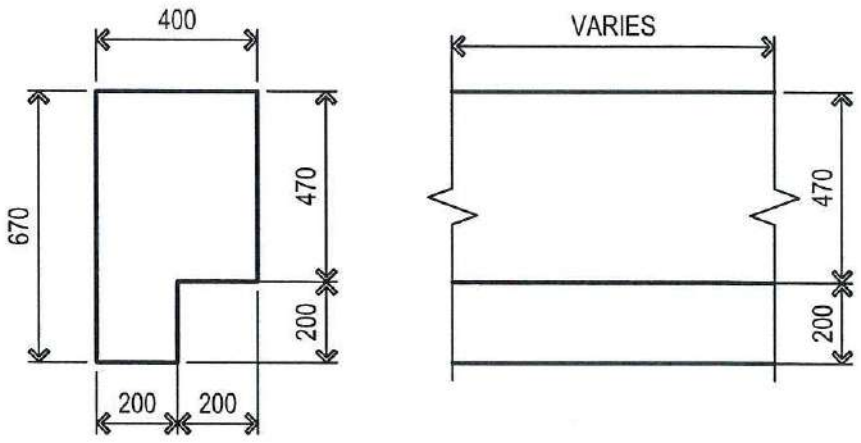
BEAM WITH CORBEL DESIGN

FALSE BEAM (NON BEARING) WITH CORBEL DESIGN





CONCRETE CORBEL AND FACADE CORNICE BLOW UP DETAIL



CONCRETE FACADE CORNICE DETAIL

A6 CONCRETE CORBEL DETAILS
SCALE NTS

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE	CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION	BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS LETYE
OWNER	PHILIPPINE COAST GUARD

PREPARED BY: CG CPO Orlando T Valle, CMAA, Architectural Branch, CGIDS

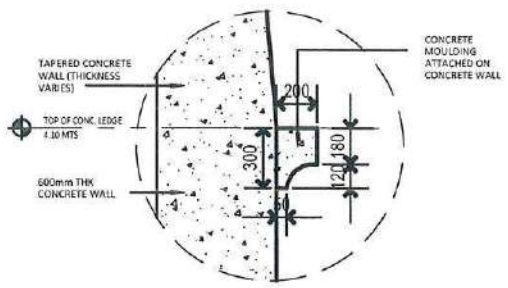
REVISION / DATE

CHECKED BY: CG ENS JOHN PATRICK E FERRE, OIC, Architectural Branch, CGIDS

RECOMMENDING APPROVAL: CG CAPT JOHN A BARRAMEDA (GSC), Deputy Commander, CGIDS

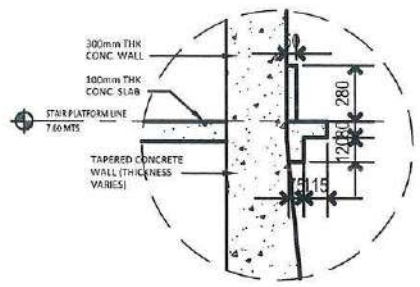
APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

SHEET NO. 6 / 12



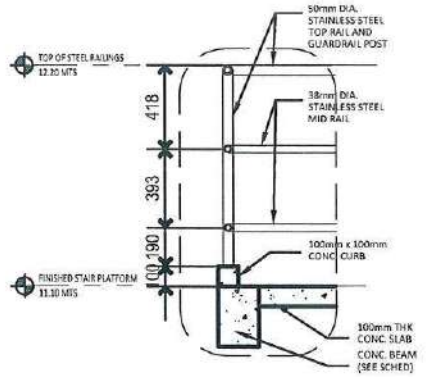
A
A 7

CONCRETE MOULDING
DETAIL
SCALE 1:25 M



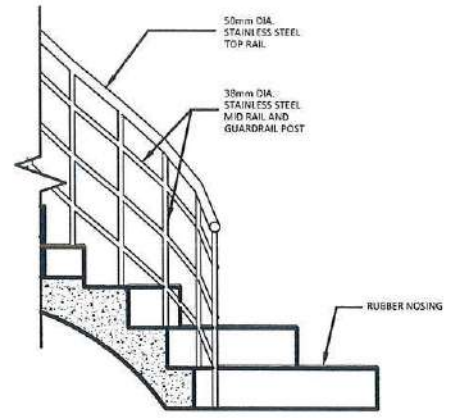
B
A 7

CONCRETE MOULDING
DETAIL
SCALE 1:25 M



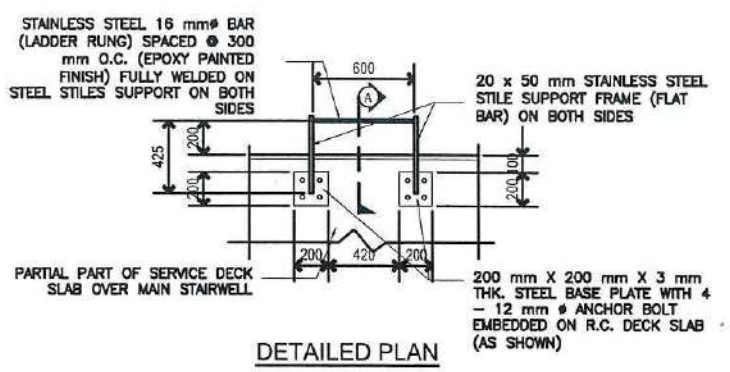
C
A 7

STEEL RAILINGS
DETAIL
SCALE 1:25 M

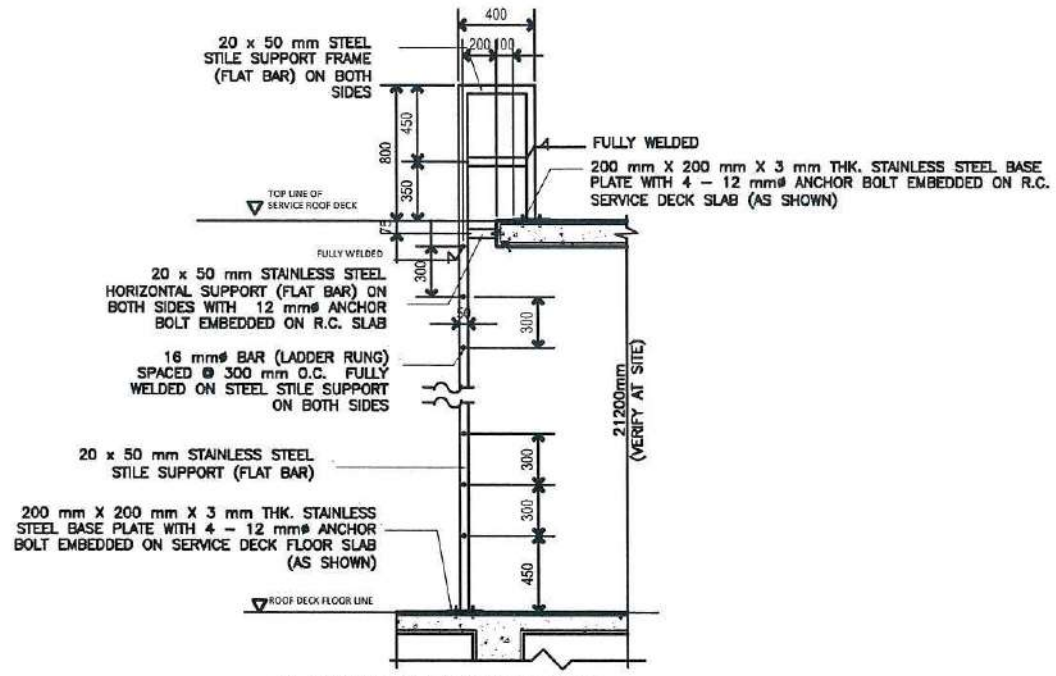


INTERIOR
D
A 7

STEEL RAILING DETAIL
SCALE 1:25 M



DETAILED PLAN



DETAILED SECTION THRU A

INTERIOR
E
A 7

STEEL LADDER RUNG DETAIL
SCALE NTS

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS LETYE
OWNER : PHILIPPINE COAST GUARD

SHEET NO. 7 / 12

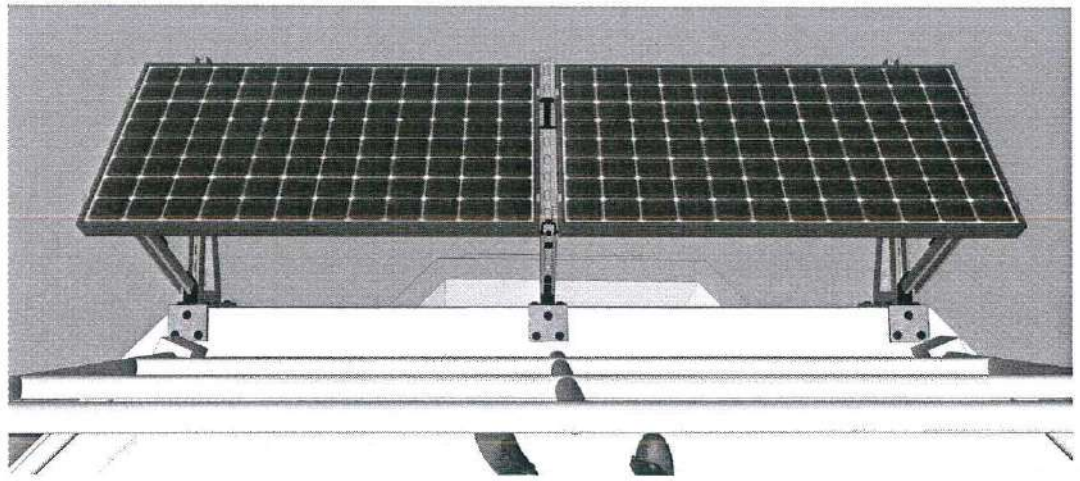
PREPARED BY:
CG CPO Orlando T Valle
CMAA, Architectural Branch, CGIDS

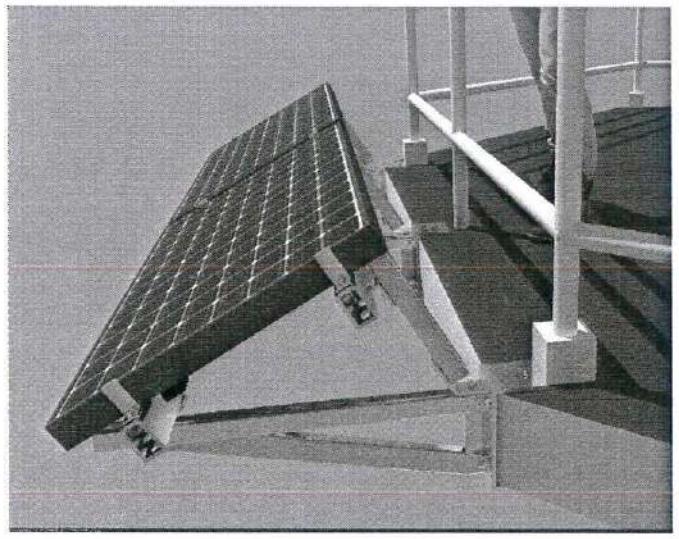
REVISION | DATE

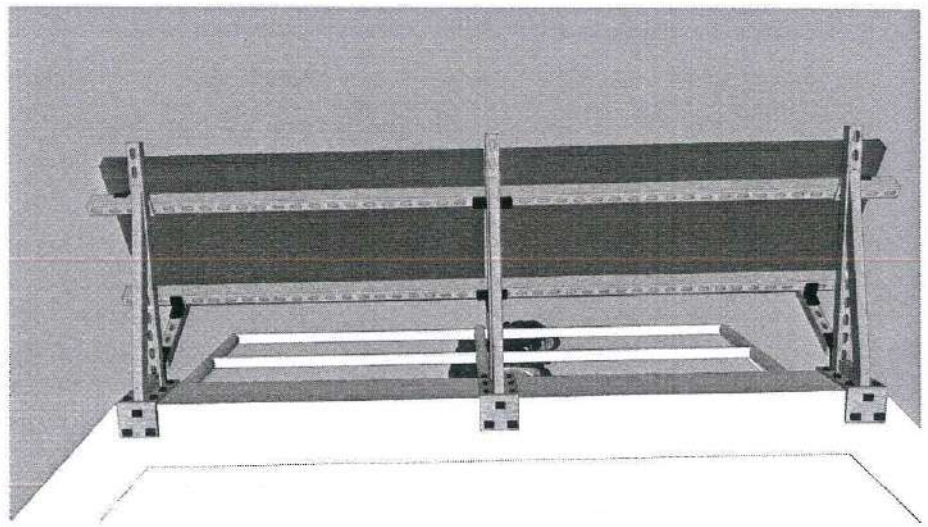
CHECKED BY:
CG ENS JOHN PATRICK E FERRE
OIC, Architectural Branch, CGIDS

RECOMMENDING APPROVAL:
CG CAPT JOHN A BARRAMEDA (GSC)
Deputy Commander, CGIDS

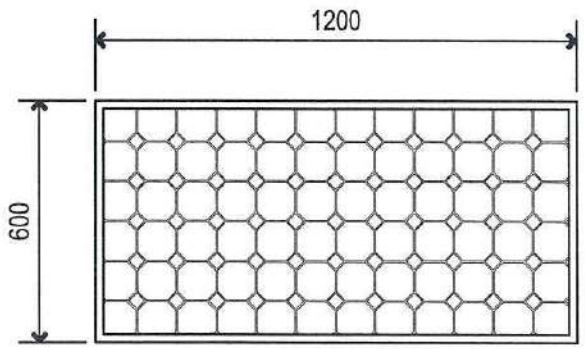
APPROVED BY:
CG COMMO PRUDENCIO C PATRICIO JR
Commander, CGIDS

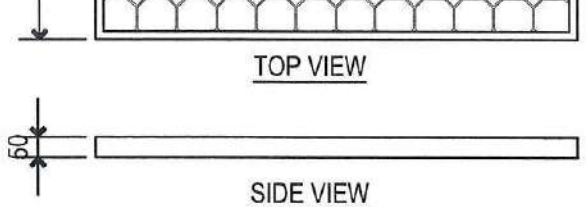




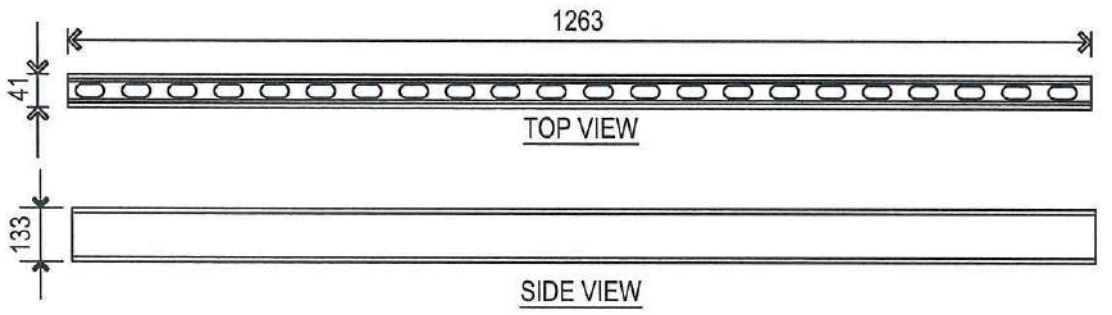


PERSPECTIVE

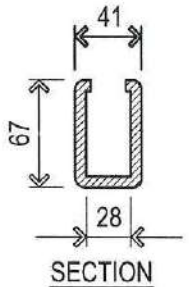


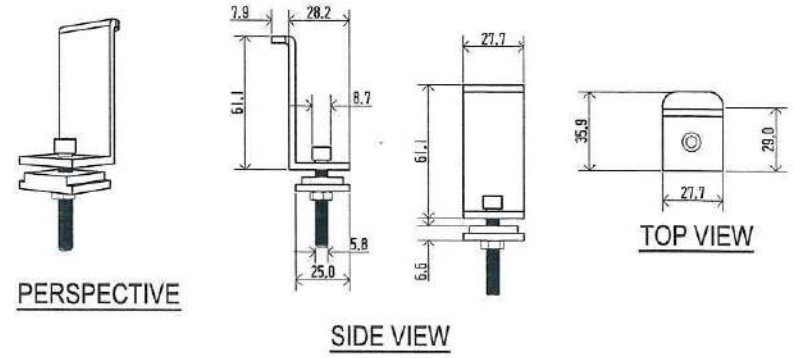


SOLAR PANEL DIMENSION

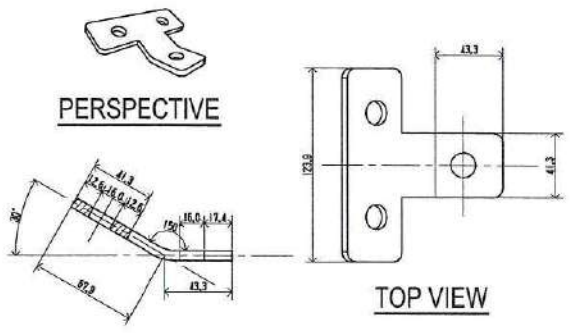


STRUT CHANNEL (HORIZONTAL SUPPORT)

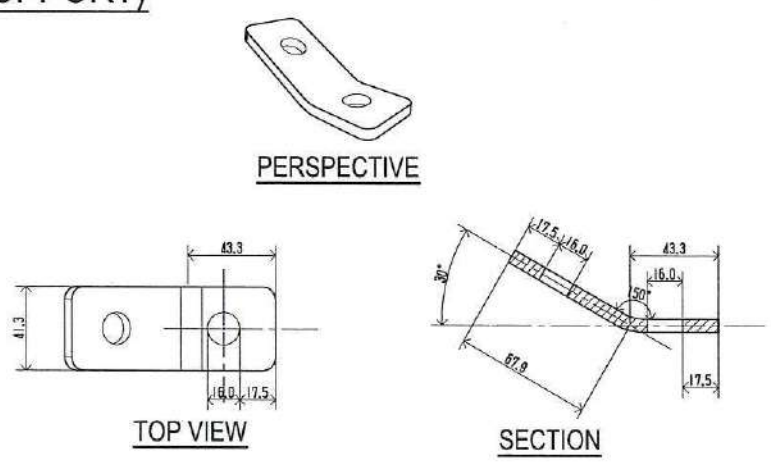




END CLAMP WITH HEX ALLEN HEAD BOLT



#5-30 DEGREES MID-ANGLE CLEAT (TRACK CONNECTOR)



#3-30 DEGREES ANGLE CLEAT (STRUT CHANNEL CONNECTOR)

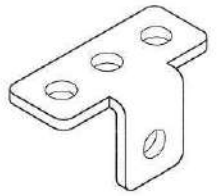
A A 8 SOLAR PANEL FRAMING DETAILS
SCALE NTS

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

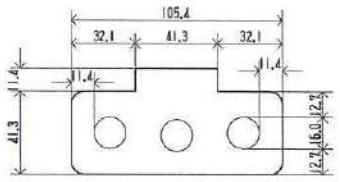
PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS LETYE
OWNER : PHILIPPINE COAST GUARD

PREPARED BY: CG CPO Orlando T Valle, CMAA, Architectural Branch, CGIDS
REVISION | DATE
CHECKED BY: CG ENS JOHN PATRICK E FERRE, EIC, Architectural Branch, CGIDS
RECOMMENDING APPROVAL: CG CAPT JOHN A BARRAMEDA (GSC), Deputy Commander, CGIDS
APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

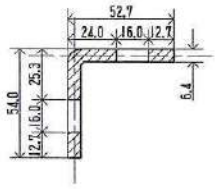
SHEET NO. 8 / 12



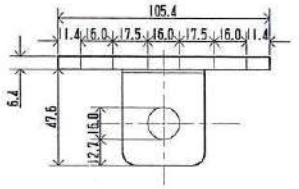
PERSPECTIVE



TOP VIEW

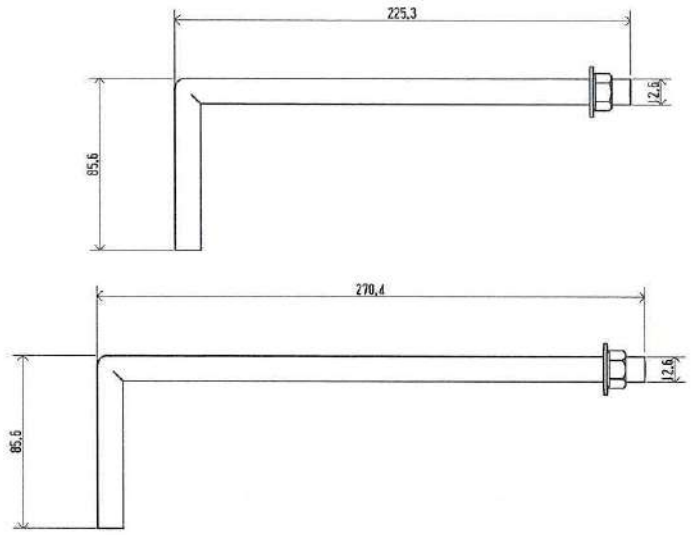


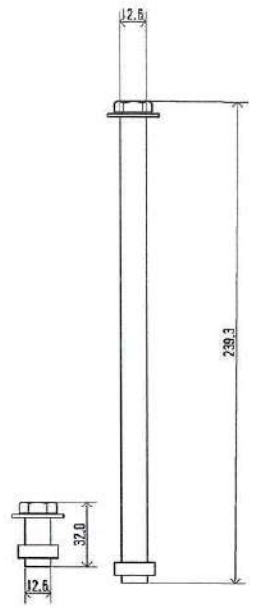
SECTION



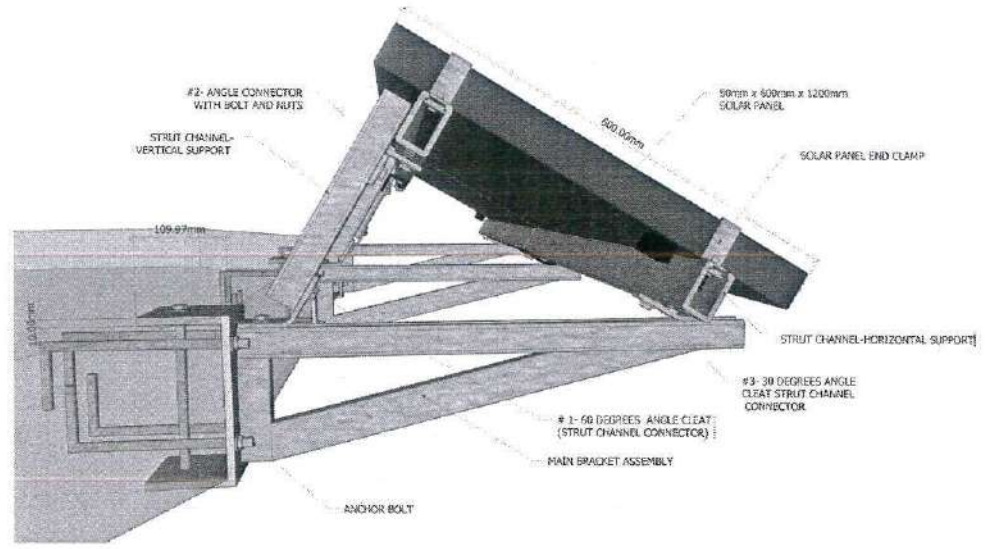
SIDEVIEW

#4-120 DEGREES MID-ANGLE CLEAT (STRUT CONNECTOR)

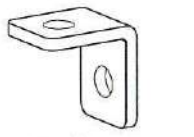




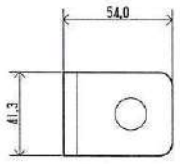
BOLT AND NUTS DETAILS



A / A 9 SOLAR PANEL FRAMING DETAILS
SCALE NTS

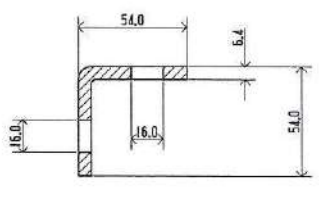


PERSPECTIVE



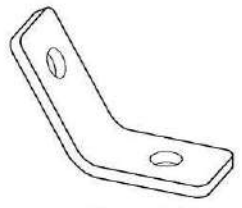
TOP VIEW

FRONT

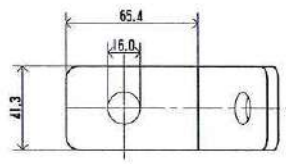


SECTION

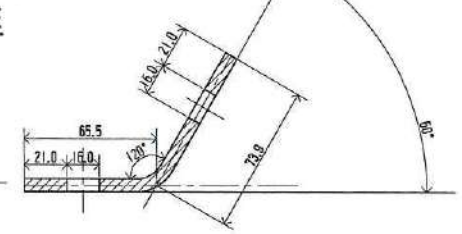
#2-60 DEGREES ANGLE CLEAT (STRUT CONNECTOR)



PERSPECTIVE



TOP VIEW

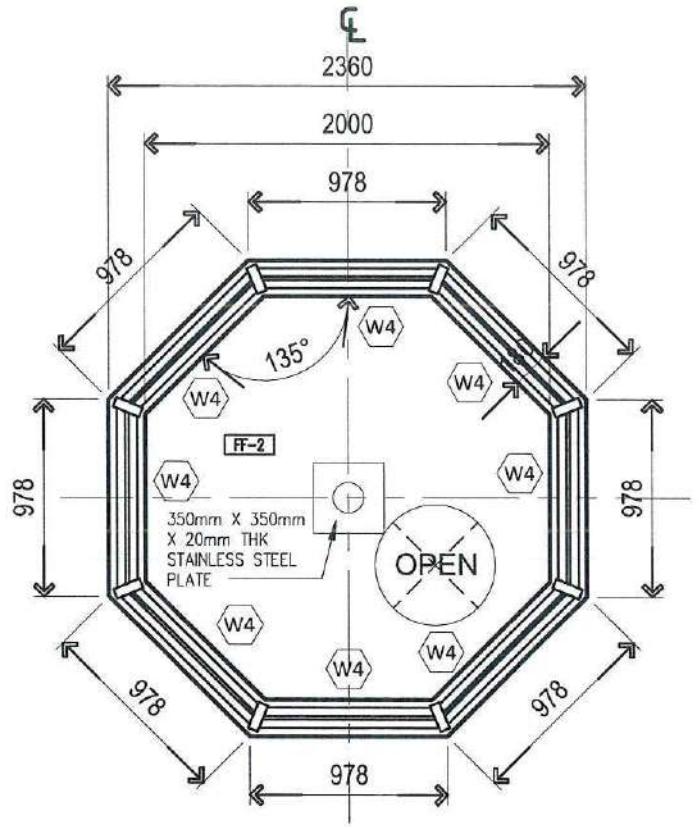


SECTION

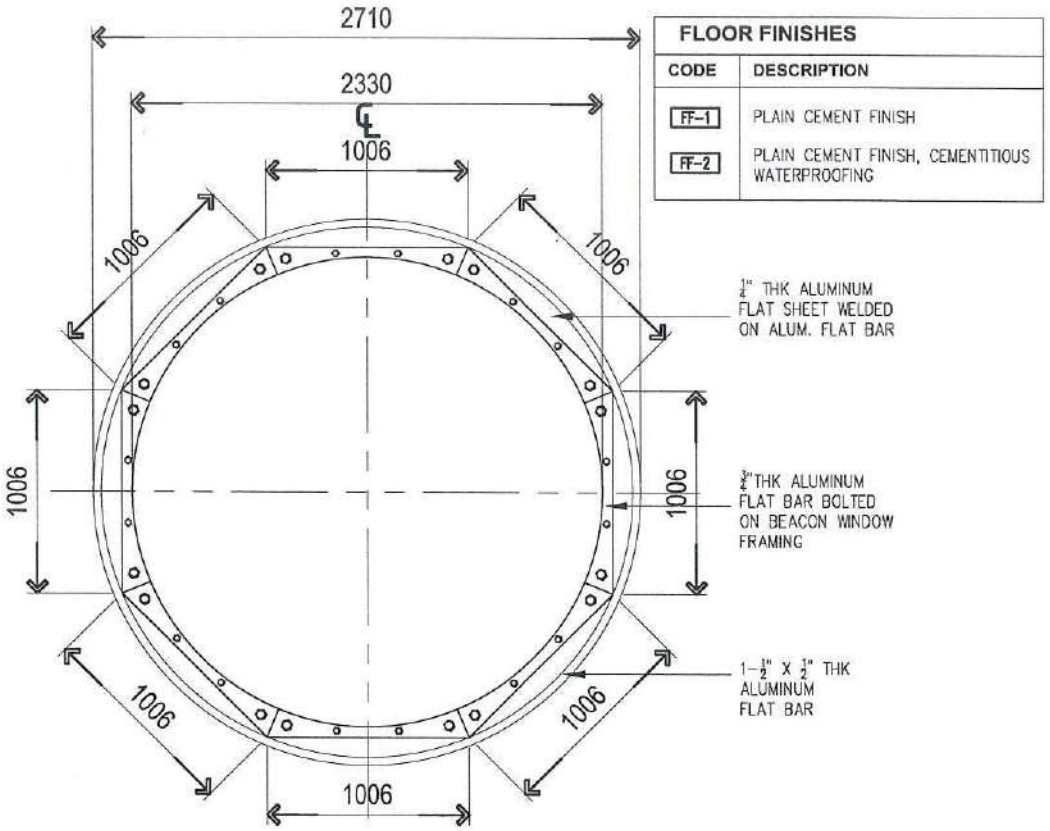
#1-60 DEGREES ANGLE CLEAT (STRUT CHANNEL CONNECTOR)

PHILIPPINE COAST GUARD HEADQUARTERS PHILIPPINE COAST GUARD 1312 25TH ST. PORT AREA MANILA COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE	PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS LETYE OWNER : PHILIPPINE COAST GUARD			SHEET NO.
PREPARED BY: CG CPO Orlando T Valle CMAA, Architectural Branch, CGIDS	CHECKED BY: CG ENS JOHN PATRICK E FERRE OIC, Architectural Branch, CGIDS	RECOMMENDING APPROVAL: CG CAPT JOHN A BARRAMEDA (GSC) Deputy Commander, CGIDS	APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR Commander, CGIDS	9 / 12
REVISION / DATE				

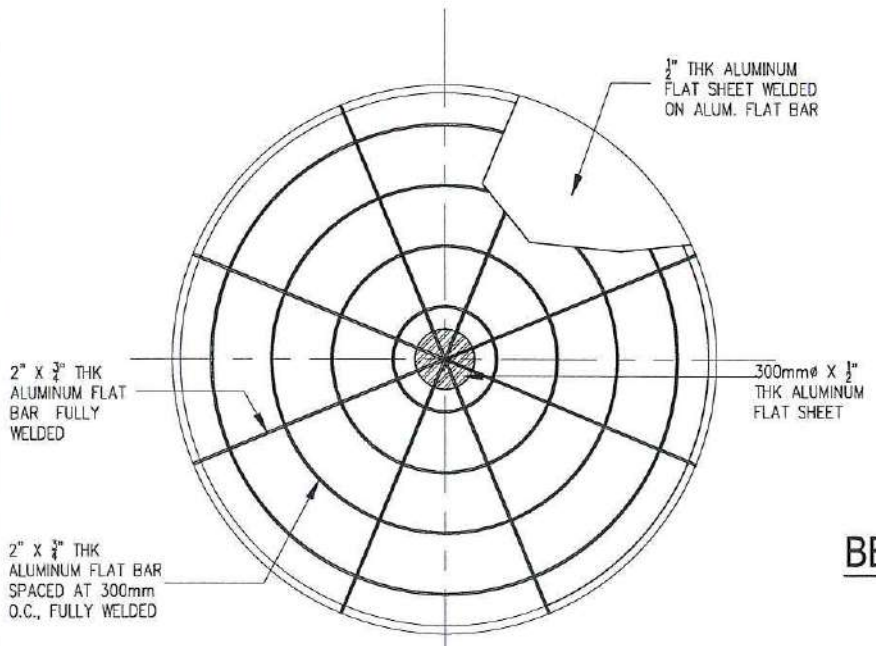
PERSPECTIVE



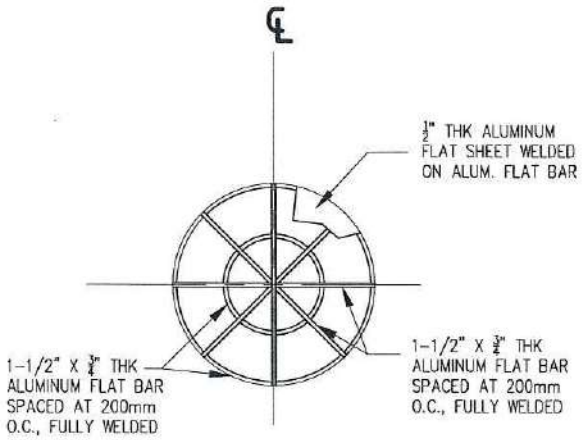
BEACON LAYOUT PLAN



BEACON ROOF CONNECTION PLAN

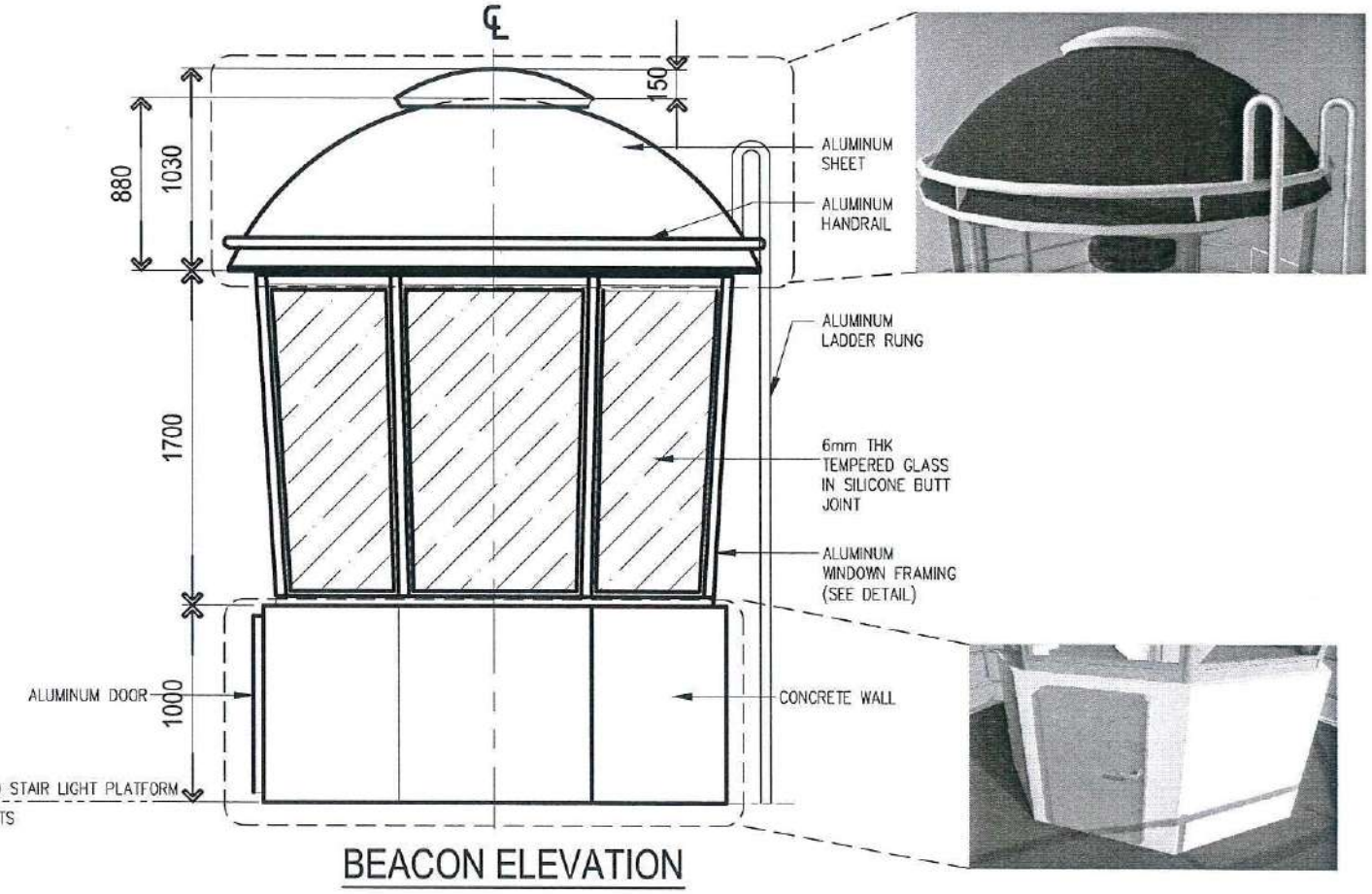


BEACON ROOF FRAMING PLAN



BEACON UPPER ROOF FRAMING PLAN

A/A10 BEACON FRAMING DETAILS
SCALE NTS



BEACON ELEVATION

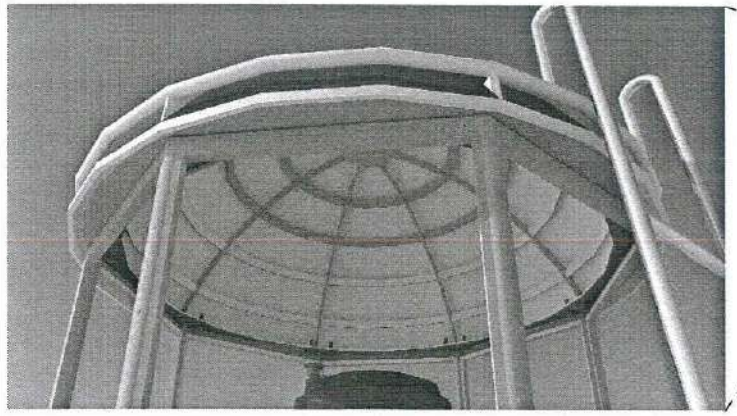
PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

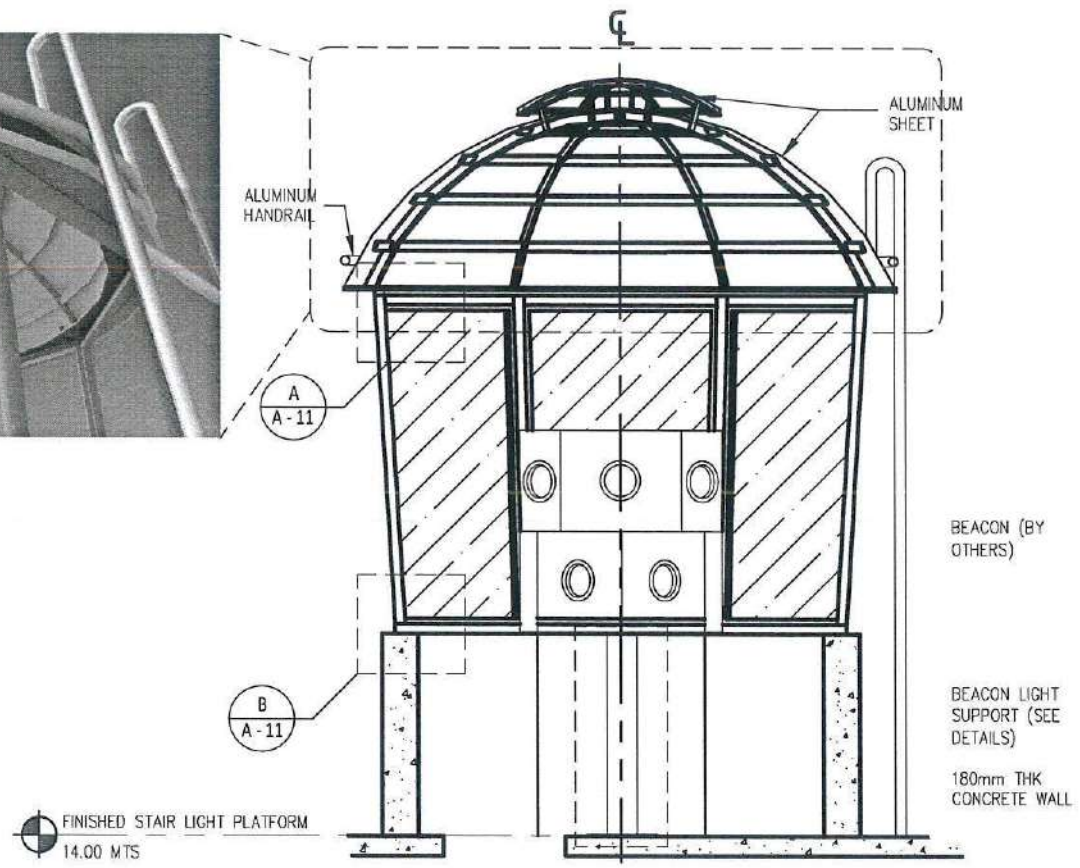
PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS LETYE
OWNER : PHILIPPINE COAST GUARD

PREPARED BY: CG CPO Orlando T Valle, CMAA, Architectural Branch, CGIDS
CHECKED BY: CG ENS JOHN PATRICK E FERRE, OIC, Architectural Branch, CGIDS
RECOMMENDING APPROVAL: CG CAPT JOHN A BARRAMEDA (GSC), Deputy Commander, CGIDS
APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

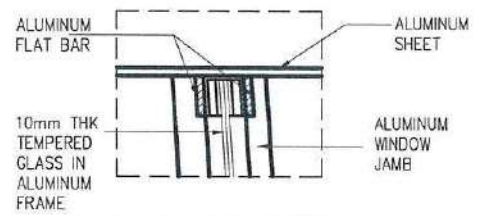
REVISION | DATE

SHEET NO. 10/12

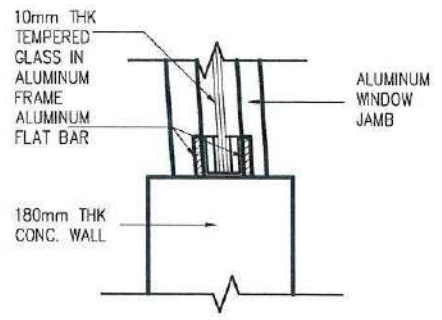




A BEACON SECTION
A 11 SCALE 1:50M



BLOW UP DETAIL A



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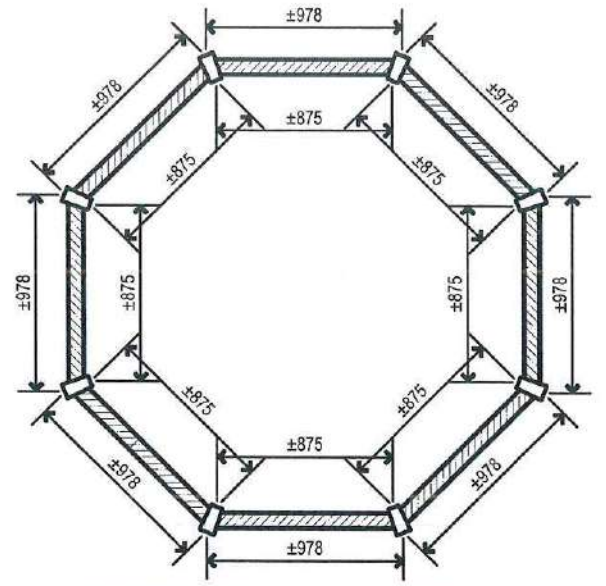
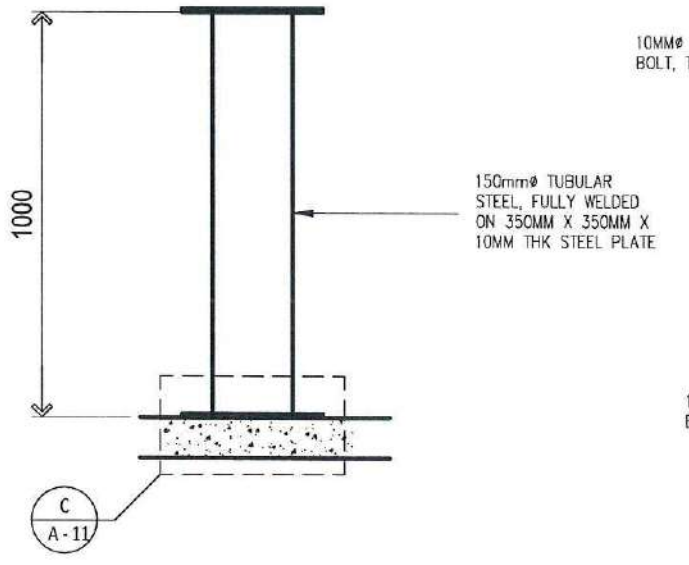
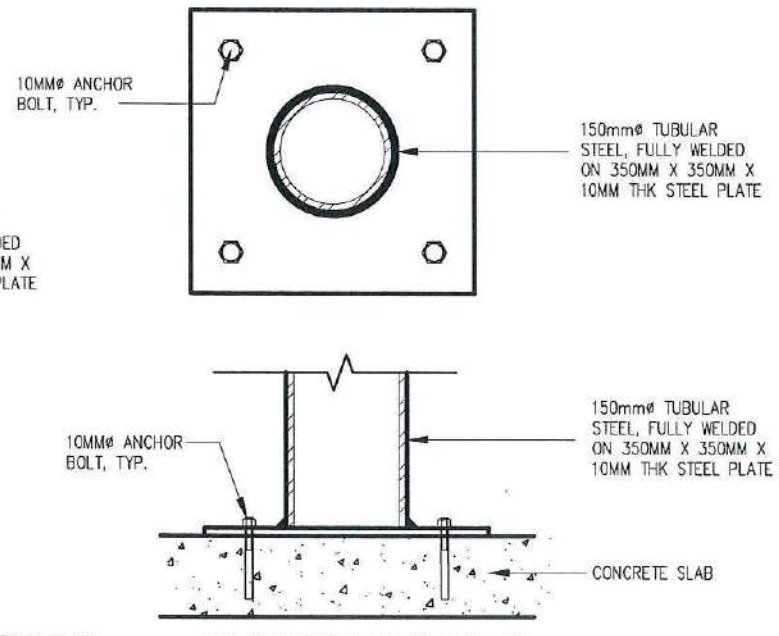


DESIGNATION	W4
DESCRIPTION	10mm THK TEMPERED GLASS IN SILICONE BUTT JOINT IN ALUMINUM FRAME
QUANTITY	ONE (1) SET = 8 PCS

C BEACON WINDOW SCHEDULE
A 11 SCALE 1:50M



B BEACON PLATFORM DETAILS
A 11 SCALE NTS



BLOW UP DETAIL C

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE	CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION	BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS LETYE
OWNER	PHILIPPINE COAST GUARD

SHEET NO. 11/12

PREPARED BY: CG CPO Orlando T Valle, CMAS, Architectural Branch, CGIDS

REVISION | DATE

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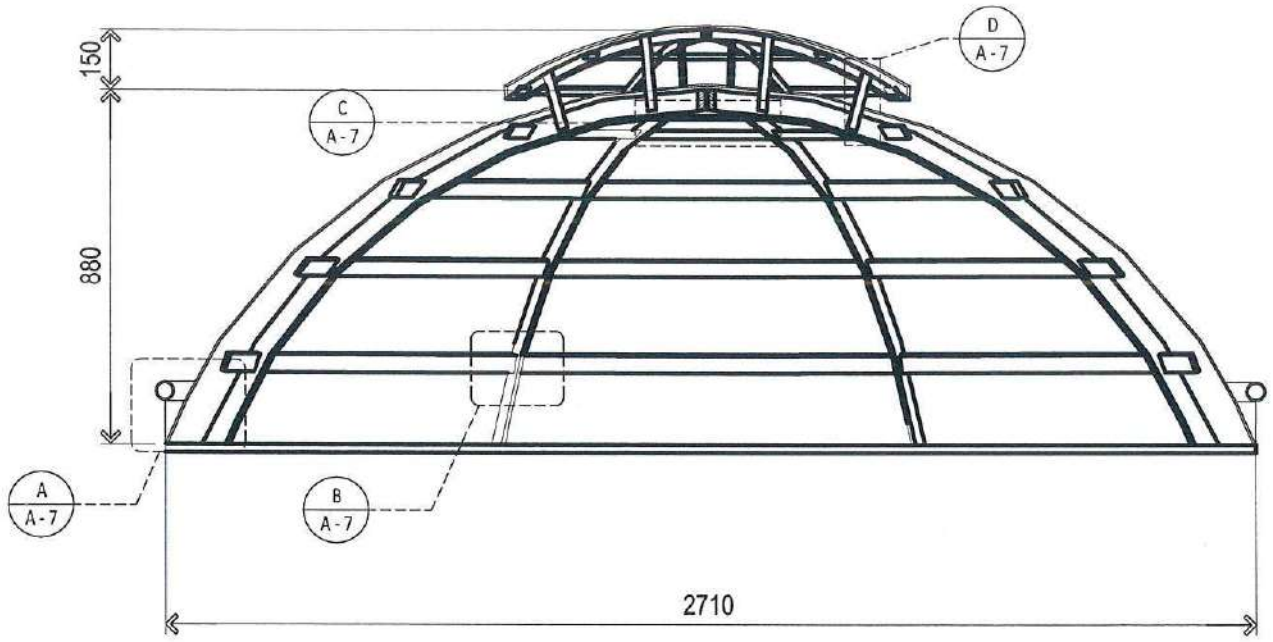
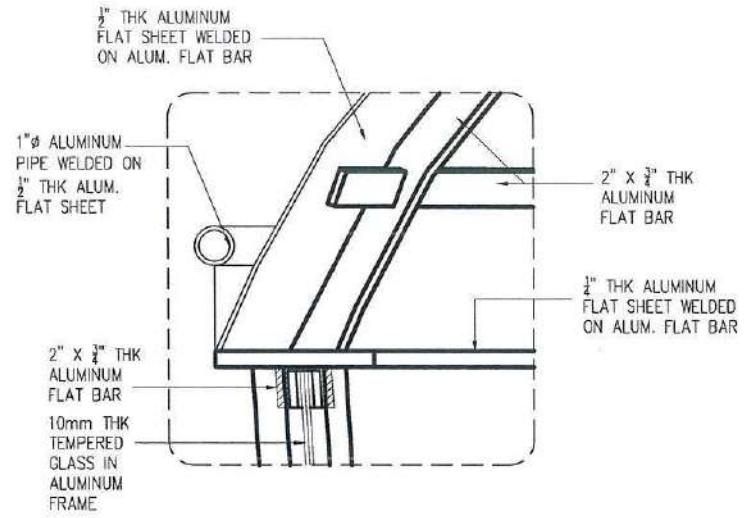
RECOMMENDING APPROVAL: CG CAPT JOHN A BARRAMEDA (GSC), Deputy Commander, CGIDS

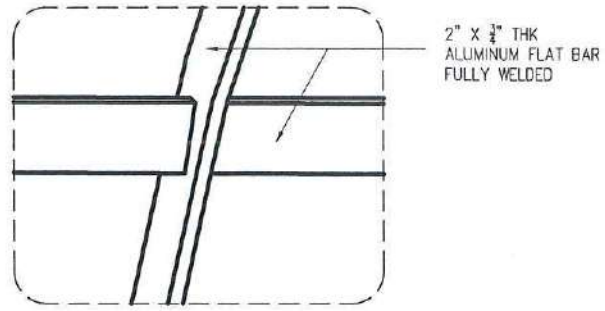
APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS



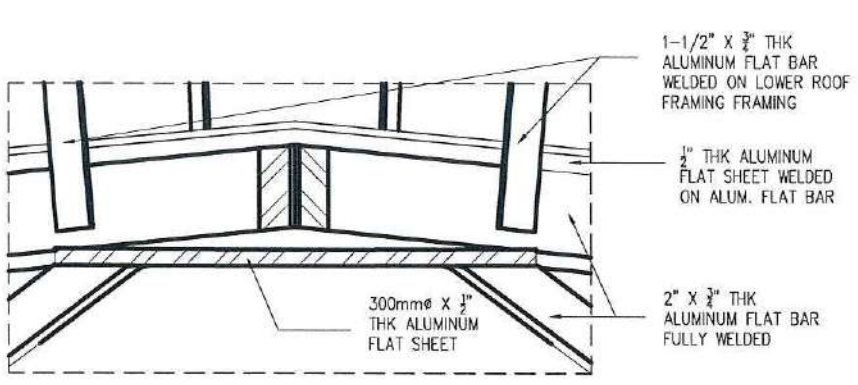
A BEACON ROOF FRAMING ELEVATION
A 12 SCALE 1:50M



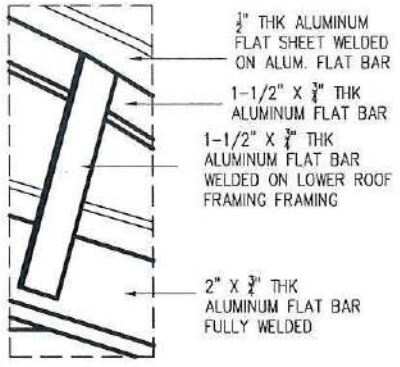
B BLOW UP DETAIL A
A 12 SCALE 1:50M



C BLOW UP DETAIL B
A 12 SCALE 1:50M



D BLOW UP DETAIL C
A 12 SCALE 1:50M



E BLOW UP DETAIL D
A 12 SCALE 1:50M

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
1312 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS LETYE
OWNER : PHILIPPINE COAST GUARD

PREPARED BY: CG CPO Orlando T Valle, CMAA, Architectural Branch, CGIDS
CHECKED BY: CG ENS JOHN PATRICK E FERRE, OIC, Architectural Branch, CGIDS
RECOMMENDING APPROVAL: CG CAPT JOHN A BARRAMEDA (GSC), Deputy Commander, CGIDS
APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

REVISION | DATE

SHEET NO. 12 / 12

GENERAL CONSTRUCTION NOTES

GENERAL NOTES

1.0 STANDARD AND REFERENCE

THE FOLLOWING SHALL GOVERN THE DESIGN, FABRICATION AND CONSTRUCTION OF THE PROJECT.

1.1 NATIONAL STRUCTURAL CODE OF THE PHILIPPINES (NSCP), VOL.1, 7TH EDITION 2015

2.0 DESIGN CRITERIA

2.1 LOADINGS

A. DEAD LOAD:

CONCRETE	24 kN/m
STEEL	76.93 kN/m
150mm THK. CHB WALL	3.38 kPa
100mm THK. CHB WALL	2.38 kPa

B. LIVE LOAD

ROOF	1.00 kPa
OFFICE	2.40 kPa
BALCONY	2.90 kPa
MULTIPURPOSE AREA / CONFERENCE HALL / ROOM	4.80 kPa
LOBBY / CORRIDORS	3.80 kPa

C. WIND LOAD (NSCP 2015)

BASIC WIND VELOCITY, V = 250 KPH

P = qh [(GCpf) - (GCpi)] (DESIGN WIND PRESSURE)

WHERE: qh = VELOCITY PRESSURE, kPa

GCpf = EXTERNAL PRESSURE COEFFICIENT

GCpi = INTERNAL PRESSURE COEFFICIENT

D. SEISMIC LOAD (NSCP 2015)

$V = \frac{CvI}{RT} W$ (DESIGN BASE SHEAR)

$Vmax = \frac{2.50\ Ca I}{RT} W$ $Vmin = \frac{0.80\ ZNvI}{R} W$ (ZONE 4)

$Vmin = 0.11CaIW$

WHERE: W = TOTAL DEAD LOAD

T = NATURAL PERIOD = $C_t(h_n)^{2/3}$

WHERE: C = NUMERICAL COEFFICIENT

h = BUILDING HEIGHT

I = IMPORTANCE FACTOR = 1.50

R = NUMERICAL FACTOR = 8.50

SEISMIC COEFFICIENT Ca = 0.44 Nv

Cv = 0.64Na

NEAR SOURCE FACTOR (2km) Nv = 2.0

Na = 1.50

Z = SEISMIC ZONE = 0.40 (ZONE 4)

S = SOIL TYPE = D

2.2 DESIGN STRESSES

A. CONCRETE FOR FOOTING, COLUMNS, BEAMS, SLAB AND SLAB ON FILL (COMPRESSIVE STRENGTH @ 28 DAYS)	fc' = 27.6 MPa (4,000 psi)
B. REINFORCING STEEL BARS	
a. FOR BARS 16mmØ AND GREATER	fy = 414 MPa (60,000 psi)
b. FOR BARS LESS THAN 16mmØ	fy = 275 MPa (40,000 psi)
C. STRUCTURAL STEEL, ASTM-A36 FOR TRUSSES, BRACINGS & STRUTS	fy = 248 MPa (36,000 psi)
D. PURLINS COLD FORMED LIGHT GAGE SHAPES	fy = 248 MPa (36,000 psi)
E. MASONRY UNIT (CHB) NON-LOAD BEARING CHB WALLS	fm' = 3.45 MPa (500 psi)
F. WELDS - USED E-70xx ELECTRODE	
G. STRUCTURAL BOLTS, ASTM-A307	
a.	Ft = 96.60 MPa (14,000 psi)
b.	Fv = 69 MPa (10,000 psi)

3.0 IN THE INTERPRETATION OF THE DRAWING, INDICATED DIMENSIONS SHALL GOVERN AND DISTANCES AND SIZES SHALL NOT BE SCALED FOR CONSTRUCTION PURPOSES.

4.0 IN REFERENCE TO OTHER DRAWINGS, SEE ARCHITECTURAL DRAWINGS FOR DEPRESSIONS IN FLOOR SLABS, OPENINGS IN THE WALLS AND SLABS, INTERIOR PARTITIONS, LOCATION OF DRAINS, ETC.

5.0 IN CASE OF DISCREPANCIES AS TO THE LAYOUT, DIMENSIONS, AND ELEVATIONS BETWEEN THE STRUCTURAL PLANS, AND ARCHITECTURAL DRAWINGS, THE CONTRACTOR SHALL NOTIFY BOTH THE STRUCTURAL ENGINEER AND THE ARCHITECT.

6.0 ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH THE ACI 318-95 BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE AND ALL STRUCTURAL STEEL WORK ACCORDING WITH AISC SPECIFICATION (9th EDITION) IN SO FAR AS THEY DO NOT CONFLICT WITH THE LOCAL BUILDING CODE REQUIREMENT.

7.0 ACI REFERS TO AMERICAN CONCRETE INSTITUTE, AISC TO AMERICAN INSTITUTE OF STEEL CONSTRUCTION AND ASTM TO AMERICAN SOCIETY FOR TESTING MATERIALS.

8.0 CONSTRUCTION NOTES AND TYPICAL DETAILS APPLY TO ALL DRAWINGS UNLESS OTHERWISE SHOWN OR NOTED. MODIFY TYPICAL DETAILS AS DIRECTED TO MEET SPECIAL CONDITIONS.

9.0 SHOP DRAWINGS WITH ERECTION AND PLACING DIAGRAMS OF ALL STRUCTURAL STEELS, MISCELLANEOUS IRON, PRE-CAST CONCRETE, ETC. SHALL BE SUBMITTED FOR ENGINEERS APPROVAL BEFORE FABRICATION

10.0 CONTRACTOR SHALL NOTE AND PROVIDE ALL MISCELLANEOUS CURBS, SILLS, STOOLS, EQUIPMENTS AND MECHANICAL BASES THAT ARE REQUIRED BY THE ARCHITECTURAL, ELECTRICAL AND MECHANICAL DRAWINGS.

11.0 ALL RESULTS OF MATERIAL TESTING FOR CONCRETE, REINFORCING BARS, & STRUCTURAL STEEL MUST BE NOTED & APPROVED BY THE STRUCTURAL DESIGNER.

NOTES ON CONCRETE MIXES & PLACING

1. ALL CONCRETE SHALL DEVELOP A MIN. COMPRESSIVE STRENGTH AT THE END OF TWENTY EIGHT (28) DAYS W/ CORRESPONDING MAXIMUM SIZE AGGREGATE & SLUMPS AS FOLLOWS:

LOCATION	28 DAYS STRENGTH	MAX. SIZE OF AGGREGATE	MAX. SLUMP
ALL OTHERS, INCLUDING SUSPENDED SLAB	4000 PSI (27.6 MPa)	20 mm	100 mm
COLUMNS	4000 PSI (27.6MPa)	20 mm	100 mm
BEAMS, SLABS	4000 PSI (27.6 MPa)	20 mm	100 mm
SLAB ON FILL	2500 PSI (17.5 MPa)	20 mm	100 mm

2. MAINTAIN MINIMUM CONCRETE COVER FOR REINFORCING STEEL AS FOLLOWS:
   - SUSPENDED SLABS _____ 20mm
   - SLAB ON GRADE _____ 40mm
   - WALLS ABOVE GRADE _____ 25mm
   - BEAM STIRRUPS AND COLUMN TIES _____ 40mm
   - WHERE CONCRETE IS EXPOSED TO EARTH BUT POURED AGAINST FORMS _____ 50mm
   - WHERE CONCRETE IS DEPOSITED DIRECTLY AGAINST EARTH _____ 75mm
3. CONCRETE SHALL BE DEPOSITED IN ITS FINAL POSITION WITHOUT SEGREGATION, RE-HANDLING OR PLACING SHALL BE DONE PREFERABLY WITH BUGGIES, BUCKETS OR WHEELBARROWS, NO CHUTES WILL BE ALLOWED EXCEPT TO TRANSFER CONCRETE FROM HOPPERS TO BUGGIES, WHEELBARROWS OR BUCKETS IN WHICH CASE THEY SHALL NOT EXCEED SIX (6) METERS IN AGGREGATE LENGTH.
4. NO DEPOSITING OF CONCRETE SHALL BE ALLOWED WITHOUT THE USE OF VIBRATORS UNLESS AUTHORIZED IN WRITING BY THE DESIGNERS AND ONLY FOR UNUSUAL CONDITIONS WHERE VIBRATIONS ARE EXTREMELY DIFFICULT TO ACCOMPLISH.
5. ALL ANCHOR BOLTS, DOWELS AND OTHER INSERTS SHALL BE PROPERLY POSITIONED & SECURED IN PLACE PRIOR TO PLACING OF CONCRETE.
6. ALL CONCRETE SHALL BE KEPT MOIST FOR A MINIMUM OF SEVEN CONSECUTIVE DAY IMMEDIATELY AFTER POURING BY THE USE OF WET BURLAP, FOG SPRAYING, CURING COMPOUNDS OR OTHER APPROVED METHODS.
7. STRIPPING OF FORMS AND SHORES:
   - FOUNDATION _____ 24 HRS
   - SUSPENDED SLAB EXCEPT WHEN ADDITIONAL LOADS ARE IMPOSED _____ 8 DAYS
   - WALLS _____ 21 DAYS
   - BEAMS _____ 14 DAYS
   - COLUMNS _____ 21 DAYS
8. THE CONTRACTOR SHALL SUBMIT THE SCHEDULE OF POURING AND THE LOCATION OF THE CONSTRUCTION JOINTS TO THE STRUCTURAL ENGINEER AT LEAST (4) DAYS PRIOR TO THE POURING FOR APPROVAL.
9. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ADEQUATE FORMS AND SHORINGS UNTIL THE CONCRETE MEMBERS HAVE ATTAINED THEIR WORKING CONDITION AND STRENGTH.

NOTES ON FOOTINGS

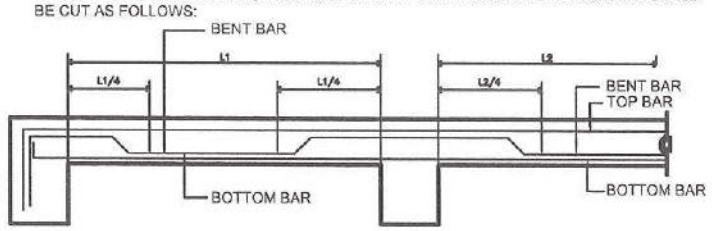
1. FOOTINGS ARE DESIGNED FOR AN ALLOWABLE SOIL BEARING PRESSURE OF 96 KPa (2000 psf). CONTRACTOR SHALL REPORT TO THE ENGINEER, IN WRITING, THE ACTUAL SOIL CONDITIONS UNCOVERED AND CONFIRM ACTUAL BEARING CAPACITY OF SOIL BEFORE DEPOSITING CONCRETE.
2. FOOTING SHALL REST AT LEAST 1500mm BELOW NATURAL GRADE LINE UNLESS OTHERWISE INDICATED IN PLANS. NO FOOTING SHALL REST ON FILL.
3. MINIMUM CONCRETE PROTECTION FOR REINFORCEMENTS SHALL BE 75mm CLEAR FOR CONCRETE DEPOSITED ON THE GROUND AND 50mm FOR CONCRETE DEPOSITED AGAINST A FORMWORK.
4. IN CASES WHERE THE SOIL CONDITION IS SUCH THAT THE MINIMUM ALLOWABLE SOIL PRESSURE OF 96 KPa (2000 psf) CAN NOT BE ATTAINED AT PRACTICAL DEPTHS, THE USE OF MICROPILES, BORED PILES, OR DRIVEN PILES, MAY BE ADOPTED IN LIEU OF STANDARD ISOLATED FOOTINGS.

NOTES ON REINFORCEMENT

1. UNLESS OTHERWISE NOTED IN PLANS, THE YIELD STRENGTH OF REINFORCING BARS SHALL BE:
   - A. FOOTINGS, FOOTING TIE BEAMS, AND GIRDERS _____ fy = 414 MPa (60,000 psi)
   - B. COLUMNS AND SHEAR WALLS _____ fy = 414 MPa (60,000 psi)
   - C. BEAMS AND GIRDER _____ fy = 414 MPa (60,000 psi)
   - D. NON - LOAD BEARING WALL PARTITIONS, BEDDED SLABS,FLOOR & ROOF SLABS, PARAPETS, CATCH BASIN, SIDE WALKS _____ fy = 227.5 MPa (33,000 psi)
2. ALL REINFORCING BARS SIZE 10mm OR LARGER SHALL BE DEFORMED IN ACCORDANCE WITH ASTM A706. BARS SMALLER THAN 10mm MAY BE PLAIN.
3. SPLICES SHALL BE SECURELY WIRED TOGETHER & SHALL LAP OR EXTEND IN ACCORDANCE W/ TABLE A & TABLE B (TABLE OF LAP SPLICES & ANCHORAGE LENGTH) UNLESS OTHERWISE SHOWN ON DRAWINGS, SPLICES SHALL BE STAGGERED WHENEVER POSSIBLE.

NOTES ON CONCRETE SLABS

1. ALL SLABS REINFORCEMENTS SHALL BE 20mm CLEAR MINIMUM FROM BOTTOM AND FROM THE TOP OF SLAB.
2. UNLESS OTHERWISE SHOWN, REINFORCEMENT IN CONTINUOUS ELEVATED SLAB SHALL BE CUT AS FOLLOWS:

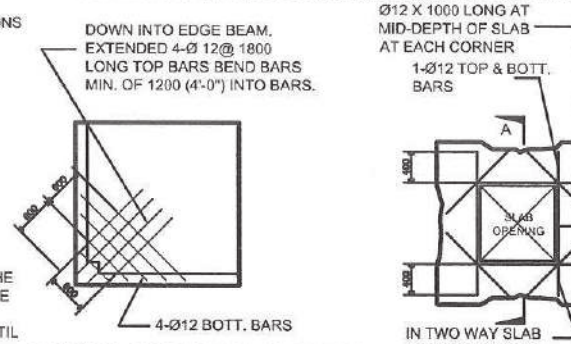


3. IF SLABS ARE REINFORCED BOTHWAYS BARS ALONG THE SHORTER SPAN SHALL BE PLACED BELOW THOSE ALONG THE LONG SPAN AT THE CENTER AND OVER THE LONGER SPAN FOR REINFORCING BARS NEAR THE SUPPORTS. THE SPACING OF THE BARS AT THE COLUMN STRIPS SHALL BE NOT BE MORE THAN ONE AND A HALF (1-1/2) SLAB THICKNESS.
4. TEMPERATURE BARS FOR SLAB SHALL BE GENERALLY PLACED NEAR THE FACE IN THE TENSION AND SHALL NOT BE LESS THAN 0.0025 X GROSS CROSS-SECTIONAL AREA (Ag) OF THE SLAB. (SEE SCHEDULE BELOW)

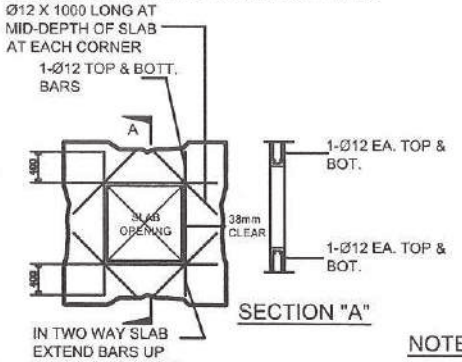
SCHEDULE OF MINIMUM SLAB REINFORCEMENT

THICKNESS	MINIMUM TEMPERATURE BARS
100 mm	10 mmØ @ 250mm EACH WAY
125 mm	10 mmØ @ 225mm EACH WAY
150 mm	10 mmØ @ 185mm EACH WAY
175 mm	10 mmØ @ 150mm EACH WAY
200 mm	10 mmØ @ 140mm EACH WAY

5. UNLESS OTHERWISE NOTED IN THE PLANS, ALL BEDDED SLABS SHALL BE REINFORCED WITH 10mm Ø AT 250mm O.C. EACH WAY TO CENTER OF SLAB AND CONSTRUCTION JOINTS FOR SAME SHALL NOT BE LESS THAN 3.65 METER APART.
6. PROVIDE EXTRA REINFORCEMENTS FOR CORNER SLAB (TWO ADJACENT DISCONTINUOUS EDGES) AS SHOWN BELOW.
7. CONCRETE SLAB REINFORCEMENTS SHALL BE PROPERLY SUPPORTED WITH 10mm Ø STEEL CHAIR OR APPROVED EQUIVALENT SPACED AT 1.0 METER ON CENTER BOTHWAYS.



TYPICAL CORNER SLAB DETAIL

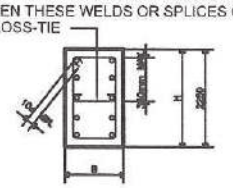


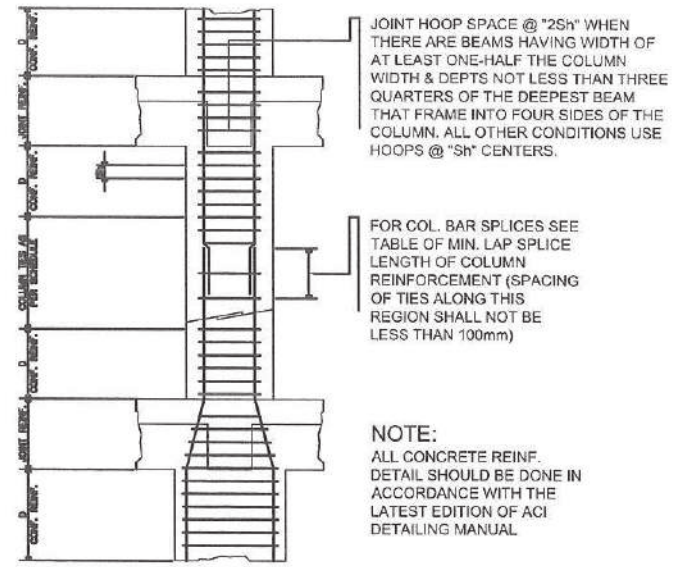
SECTION "A"

TYPICAL SLAB OPENING DETAIL

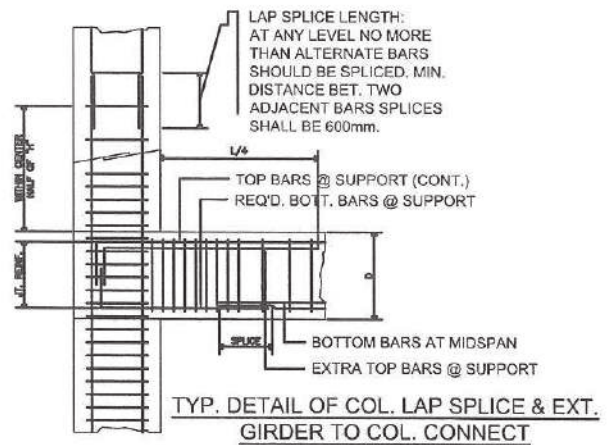
NOTES ON COLUMNS

1. PROVIDE EXTRA SETS OF TIES AT 100mm O.C. FOR TIED COLUMN REINFORCEMENT ABOVE AND BELOW BEAM-COLUMN CONNECTIONS FOR A DISTANCE FROM FACE OF CONNECTION EQUAL TO THE GREATER OF THE OVERALL THICKNESS OF COLUMN, 1/6 THE CLEAR HEIGHT OF COLUMN OR 450mm.
2. COLUMN TIES SHALL BE PROTECTED EVERYWHERE BY A COVERING OF CONCRETE CAST MONOLITHICALLY WITH THE CORE WITH THE MINIMUM THICKNESS OF 40mm AND NOT LESS THAN 40 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE IN MILLIMETERS.
3. WHERE COLUMNS CHANGE IN SIZE, VERTICAL REINFORCEMENTS SHALL BE OFFSET AT A SLOPE OF NOT MORE THAN 1 IN 6 AND EXTRA 10mm TIES AT 100mm SHALL BE PROVIDED THRU OUT THE OFFSET REGION.
4. UNLESS OTHERWISE INDICATED IN THE PLANS, LAP SPLICES FOR VERTICAL COLUMN REINFORCEMENTS SHALL BE MADE WITHIN THE CENTER HALF OF COLUMN HEIGHT, AND THE SPLICE LENGTH SHALL NOT BE LESS THAN 40 BAR DIAMETERS. WELDING OR APPROVED BARS ARE WELDED OR MECHANICALLY SPLICED AT ANY LEVEL AND THE VERTICAL DISTANCES BETWEEN THESE WELDS OR SPLICES OF ADJACENT BARS IS NOT LESS THAN 600mm.





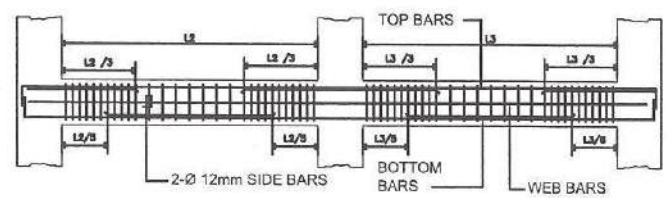
TYPICAL COLUMN ELEV. SHOWING DOWELS AND TIES SPACING



TYP. DETAIL OF COL. LAP SPLICE & EXT. GIRDER TO COL. CONNECT

NOTES ON BEAMS AND GIRDERS

1. UNLESS OTHERWISE NOTED IN PLANS, CAMBER ALL BEAMS AND GIRDERS AT LEAST 6mmØ FOR EVERY 4.50M OF SPAN, EXCEPT CANTILEVERS FOR WHICH THE CAMBER SHALL BE AS NOTED IN PLANS OR AS ORDERED BY THE ENGINEER BUT IN NO CASE LESS THAN 20mm FOR EVERY 3.0M OF FREE SPAN.
2. TYPICAL BARS BENDING AND CUTTING DETAILS SHALL BE AS SHOWN IN FIG. B-1.
3. IF THE BEAM REINFORCING BARS END IN A WALL THE CLEAR DISTANCE FROM THE BAR TO THE FARTHER FACE OF THE WALL NOT BE LESS THAN 25mm. EMBEDMENT LENGTH SHALL BE AS SHOWN IN A TABLE "A" FOR TENSION BARS AND TABLE "B" FOR COMPRESSION BARS UNLESS SPECIFIED IN PLAN. TOP BAR SHALL NOT BE SPLICED WITHIN THE COLUMN OR WITHIN A DISTANCE TWICE THE MEMBER DEPTH FROM THE FACE OF THE COLUMN. AT LEAST TWO STIRRUPS SHALL BE PROVIDED AT ALL SPLICES.



PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
139 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE	CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION	BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER	PHILIPPINE COAST GUARD

PREPARED BY: Engr Josephine Marie B Trinidad, CE, Engineer III

REVISION | DATE

CHECKED BY: CG LTJG ROMMEL O PAGARANG, Asst Head, Planning, Programming and Design Division

RECOMMENDING APPROVAL: Engr Hilario A Adaya, REE, Engineer IV

APPROVED BY: CG COMMO PRUDENCIO G PATRICIO JR, Commander, CGIDS

SHEET NO. 1/5

GENERAL CONSTRUCTION NOTES

FIG. B-1

TABLE 'A'
TENSION BARS
EMBEDMENT LENGTHS AND LAPPED SPLICED IN MILLIMETERS

BAR SIZE (DEFORMED)	fc' = 20.7 MPa (3000psi)		fc' = 27.6 MPa (4000psi)	
	EMBEDMENT	LAPPED	EMBEDMENT	LAPPED
10mm Ø	300	300	300	300
12mm Ø	300	300	300	300
16mm Ø	300	400	300	400
20mm Ø	400	550	350	500
25mm Ø	600	800	550	750
28mm Ø	750	1000	650	850
32mm Ø	950	1300	850	1100

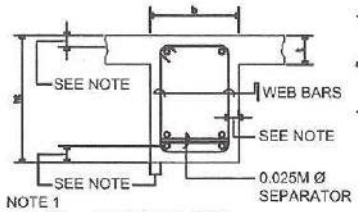
NOTE: TOP PLAIN BARS, MULTIPLY VALUE BY 2

TABLE 'B'
COMPRESSION BARS
EMBEDMENT LENGTHS AND LAPPED SPLICED IN MILLIMETERS

BAR SIZE (DEFORMED)	fc' = 20.7 MPa (3000psi)		fc' = 27.6 MPa (4000psi)	
	EMBEDMENT	LAPPED	EMBEDMENT	LAPPED
10mm Ø	225	300	200	300
12mm Ø	275	300	250	300
16mm Ø	350	400	325	400
20mm Ø	450	500	475	500
25mm Ø	550	625	550	625
28mm Ø	625	675	625	675
32mm Ø	700	775	700	775

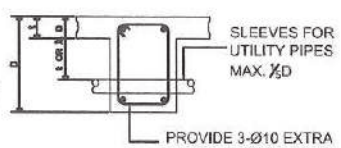
NOTE: TOP PLAIN BARS, MULTIPLY VALUE BY 2
VALUES GIVEN ABOVE CAN ALSO BE USED FOR COLUMNS

4. IF THERE ARE TWO OR MORE LAYERS OF REINFORCING BARS, USE 25mmØ BAR SEPARATORS SPACED AT 1.0M ON CENTERS. IN NO CASE SHALL THERE BE LESS THAN TWO (2) SEPARATORS BETWEEN TWO LAYERS OF BARS.
5. MINIMUM CONCRETE PROTECTION FOR REINFORCING BARS OR STEEL SHAPES SHALL BE AS SHOWN IN FIG. B-2 UNLESS SPECIFIED ELSEWHERE.



NOTE 1
20mm CLEAR FOR JOIST
40mm CLEAR FOR BEAMS AND GIRDERS

FIG. B-2



TYP. DET. FOR SLEEVES THRU CONCRETE BEAM

FIG. B-3

6. WHEN A BEAM CROSSES A GIRDER, REST BEAM ON TOP OF GIRDER BARS, BEAM REINFORCING BAR SHALL BE SYMMETRICAL ABOUT CENTER LINE WHENEVER POSSIBLE.
7. GENERALLY NO SPLICES SHALL BE PERMITTED AT POINTS WHERE CRITICAL BENDING STRESSES OCCUR, SPLICES WHERE SO PERMITTED SHALL BE INDICATED IN THE TABLE 'A' AND 'B'. WELDED SPLICES SHALL DEVELOP IN TENSION AT LEAST 125% OF THE SPECIFIED YIELD STRENGTH OF THE BAR. NOT MORE THAN 50% OF THE BARS AT ANY ONE SECTION IS ALLOWED TO BE SPLICED THEREIN.

NOTES ON CONCRETE HOLLOW BLOCK WALLS

1. UNLESS OTHERWISE SHOWN IN PLANS ALL CONCRETE HOLLOW BLOCKS AND CERAMIC BLOCKS SHALL BE REINFORCED AS SHOWN IN THE SCHEDULE OF CONCRETE HOLLOW BLOCKS AND CERAMIC BLOCK REINFORCEMENT.
2. PROVIDE 150mm x 300mm STIFFENER COLUMN REINFORCED WITH 4-12mm WITH 6mmØ TIES AT 150mm ON CENTER WHERE CONCRETE HOLLOW BLOCK TERMINATES AND AT EVERY 3.0m LENGTH OF CONCRETE HOLLOW BLOCK WALLS UNLESS NOTED IN STRUCTURAL PLANS.

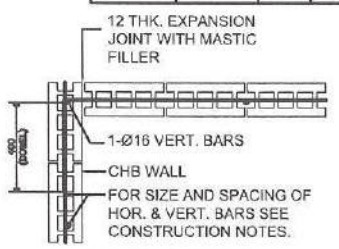
SCHEDULE OF CONCRETE HOLLOW BLOCK AND CERAMIC BLOCK REINFORCEMENT

BLOCK THICKNESS	REINFORCEMENT		NOTES
	HORIZONTAL	VERTICAL	
75 mm	10mmØ @ EVERY 3RD LEVEL	10mmØ @ 600mm O.C.	A. MINIMUM LAPS AT SPLICE = 0.25M B. PROVIDE RIGHT ANGLED REINFORCEMENT AT CORNERS 0.92M LONG C. WHERE CHB OR CER. BLK. WALL DOWELS JOIN COL. R.C. BEAMS AND WALL DOWELS WITH THE SAME SIZE AS VERT. OR HOR. REINFORCEMENTS SHALL BE PROVIDED
125 mm	10mmØ @ EVERY 3RD LEVEL	10mmØ @ 600mm O.C.	
150 mm	10mmØ @ EVERY 3RD LEVEL	10mmØ @ 600mm O.C.	
200 mm	12mmØ @ EVERY 3RD LEVEL	10mmØ @ 600mm O.C.	

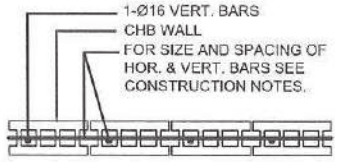
REINFORCING CONCRETE LINTEL BEAM IN CONCRETE BLOCK WALLS

LINTELS IN BLOCK WALLS

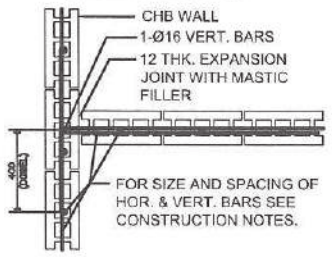
CLEAR SPAN ("L")	TOTAL LENGTH (L+0.40m)	MIN. fc' (MPa)	HEIGHT OF LINTEL (mm)	REINFORCEMENT		
				BOTTOM	TOP	STIRRUPS
1.20 m	1.60 m	14.0	200	1 - Ø10	1 - Ø10	Ø6mm @ 200mm
1.50 m	1.90 m		200	1 - Ø10	1 - Ø10	Ø6mm @ 200mm
1.80 m	2.20 m		200	1 - Ø10	1 - Ø10	Ø6mm @ 200mm
2.10 m	2.50 m	17.0	250	1 - Ø12	1 - Ø10	Ø6mm @ 200mm
2.40 m	2.90 m		250	1 - Ø12	1 - Ø10	Ø6mm @ 200mm
2.70 m	3.10 m		250	1 - Ø16	1 - Ø12	Ø10mm @ 200mm
3.00 m	3.40 m	20.0	300	1 - Ø16	1 - Ø12	Ø10mm @ 200mm
3.30 m	3.70 m		300	1 - Ø16	1 - Ø12	Ø10mm @ 200mm
3.60 m	4.00 m		300	1 - Ø20	1 - Ø12	Ø10mm @ 200mm



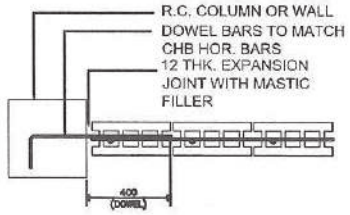
CORNER WALL



OPENING OR END WALL

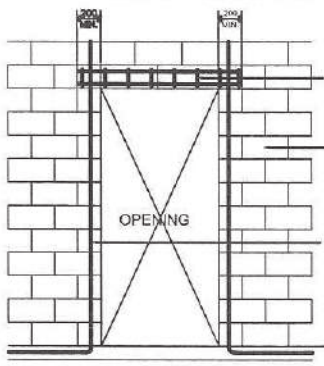


INTERSECTION WALL

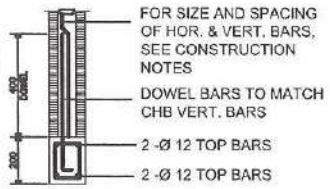


INTERSECTION R.C. COL. OR WALL

TYPICAL CONNECTION DETAIL OF MASONRY WALL

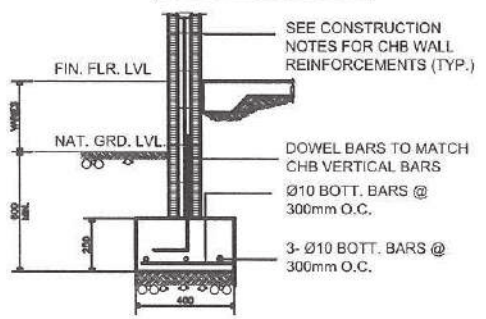


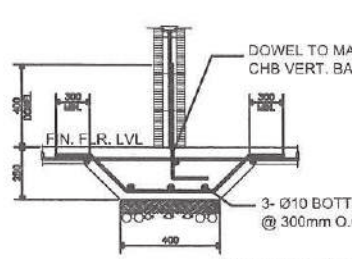
ELEVATION

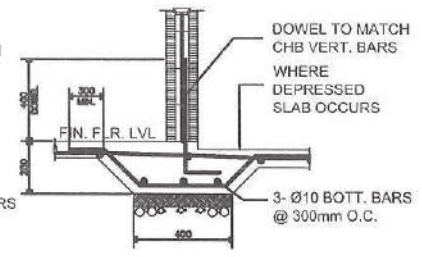


SECTION

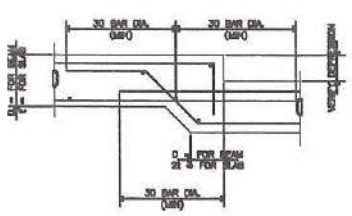
TYP. DET. OF LINTEL BEAM AT CHB WALL OPENING



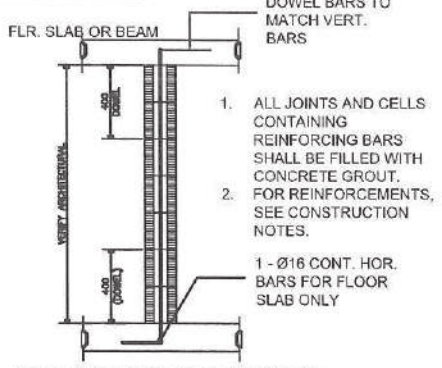




TYPICAL CHB FOOTING DETAILS (WHERE APPLICABLE)



TYPICAL DETAIL FOR BEAM OR SLAB CHANGE SOFFIT



TYP. SECTION OF MASONRY PARTITION REINFORCEMENTS

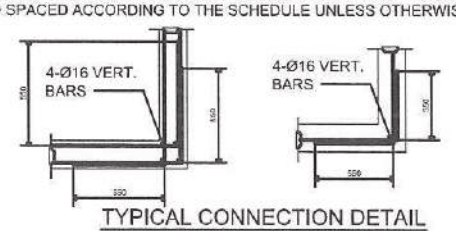
NOTES ON CONCRETE WALLS

1. ALL WALLS SHALL BE REINFORCED ACCORDING TO THE FOLLOWING SCHEDULE OF WALL REINFORCEMENT UNLESS OTHERWISE INDICATED IN THE PLANS.

WALL THICKNESS	REINFORCEMENT			VERTICAL SECTION
	HORIZONTAL	VERTICAL	REMARKS	
100mm	Ø10mm @ 250mm O.C.	Ø10mm @ 300mm O.C.	HORIZONTAL BARS AT CENTERS VERTICAL BARS STAGGERED OUT	VERT. BARS / HORIZ. BARS
125mm	Ø10mm @ 200mm O.C.	Ø10mm @ 250mm O.C.		
150mm	Ø12mm @ 250mm O.C.	Ø12mm @ 300mm O.C.		

REINFORCING BARS SHALL HAVE 25mm CLEAR CONCRETE COVER FROM FACE OF WALL EXCEPT FOR WALLS IN CONTACT WITH THE GROUND WHERE A MINIMUM OF 60mm SHALL BE PROVIDED, AND FOR EXPOSED FACES OF FORMED WALLS WHERE THE MINIMUM SHALL BE 50mm CLEAR.

2. CARRY VERTICAL BARS AT LEAST 60mm ABOVE FLOOR LEVEL TO PROVIDE FOR SPLICES WHEN NECESSARY STOP AT 50mm BELOW TOP SLAB OR SOLID BAND WHERE THE WALL ENDS VERTICAL AND HORIZONTAL BARS SHALL BE SPLICED BY LAPPING A DISTANCE EQUAL TO 30 DIAMETERS AND WIRED SECURELY WITH 16 G.I. WIRE PROVIDED THAT SPLICES IN ADJACENT BARS ARE STAGGERED AT LEAST 1.50M.O.C.
3. UNLESS OTHERWISE NOTED IN THE PLANS, ALL OPENINGS IN WALLS 250mm OR THICKER SHALL BE REINFORCED AROUND WITH 2-20mm Ø BARS FOR 225mm, 200mm, 175mm, 150mm, USE 2-16mmØ. FOR 125mm AND 100mm WALLS, USE 2-12mmØ BARS. ALL WALLS SPANNING SHALL HAVE VERTICAL REINFORCEMENT BENT TO A U-FORM LIKE STIRRUPS AND SPACED ACCORDING TO THE SCHEDULE UNLESS OTHERWISE NOTED (SEE FIG.1)



TYPICAL CONNECTION DETAIL OF R.C. WALL AT CORNERS

NOTES ON WELDS

1. USE E70xx ELECTRODES FOR ALL MEMBERS WELDED.
2. WELDS SHALL DEVELOP THE FULL STRENGTH OF MEMBERS JOINED UNLESS OTHERWISE SHOWN OR DETAILED IN THE DRAWINGS.

NOTES ON STRUCTURAL STEEL

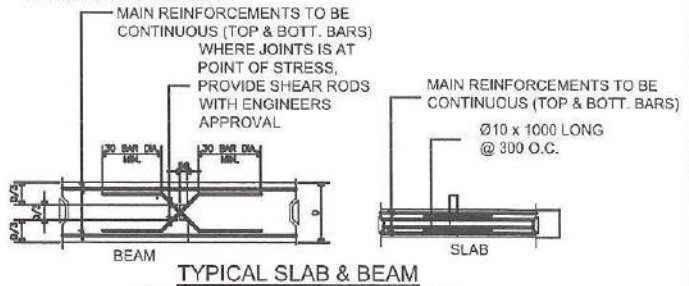
1. STRUCTURAL STEEL TO BE USED FOR FABRICATION AND ERECTION OF THIS STRUCTURE SHALL COMPLY WITH ALL THE PERTINENT PROVISION OF AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDING LATEST EDITION.
2. ALL STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A36 STRUCTURAL STEEL UNLESS OTHERWISE INDICATED.
3. ALL WELDED CONNECTIONS SHALL DEVELOP THE FULL STRENGTH OF THE MEMBERS CONNECTED.
4. UNLESS OTHERWISE SPECIFIED ALL WELDING RODS SHALL CONFORM AWS E60 ELECTRODES.
5. ALL BOLTS USED UNLESS OTHERWISE SPECIFIED SHALL BE ASTM A307 BOLTS.

NOTES ON EMBEDDED PIPES

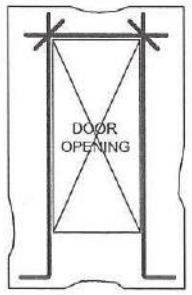
1. ALL EMBEDDED PIPES FOR UTILITIES, ETC. THAT PASS THRU BEAMS SHALL NOT EXCEED 100mm IN DIAMETER OR ⅓ BEAM DEPTH WHICHEVER IS LESS, UNLESS OTHERWISE APPROVED IN WRITING BY THE STRUCTURAL ENGINEER.
2. NO PIPES SHALL BE ALLOWED TO PASS THRU BEAM VERTICALLY.
3. NO PIPES SHALL BE EMBEDDED IN COLUMNS.

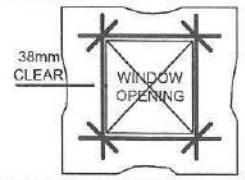
NOTES ON CONSTRUCTION JOINTS IN CONCRETE

1. WHERE A CONSTRUCTION JOINT IS TO BE MADE, THE SURFACE OF CONCRETE SHALL BE CLEANED AND ALL LAITANCE AND STANDING WATER REMOVED. SHEAR KEY SHALL BE PROVIDED AT THE JOINT.



TYPICAL SLAB & BEAM CONSTRUCTION JOINT DETAIL





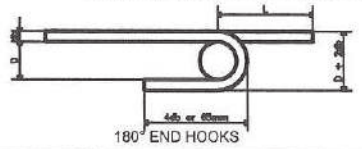
NOTE:
PROVIDE THESE ADDITIONAL BARS FOR ALL OPENINGS PLUS BARS (NOT SHOWN) PARALLEL TO SIDE OF OPENING EQUAL TO THE NUMBER OF TERMINATED BARS AT OPENING

SEE ARCHITECTURAL & MECHANICAL PLANS FOR SLAB OPENING LOCATION.

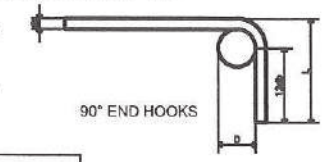
TYP. EXTERIOR WINDOW & DOOR OPENING

NOTES ON STIRRUPS

1. ALL REINFORCEMENT SHALL BE BENT COLD UNLESS OTHERWISE PERMITTED BY THE STRUCTURAL ENGINEER.
2. AS SHOWN IN THE DESIGN DRAWINGS OR PERMITTED BY THE STRUCTURAL ENGINEER, TIES & CLOSE STIRRUPS MUST BE BENT AT 135°.



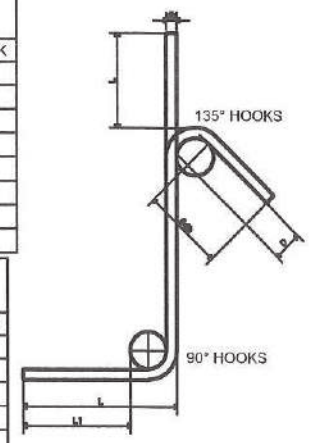
180° END HOOKS



90° END HOOKS

MAIN BAR END HOOKS (ALL GRADES)

BAR SIZE (DEFORMED)	DIAMETER (mm)	180° HOOK		90° HOOK
		D+2db	L	L
10mm Ø	60	75	125	150
12mm Ø	75	100	150	200
16mm Ø	95	125	175	250
20mm Ø	115	150	200	300
25mm Ø	150	200	230	450
28mm Ø	240	300	350	550
32mm Ø	300	335	450	600



STIRRUPS AND TIE HOOKS (ALL GRADES)

BAR SIZE (DEFORMED)	DIAMETER (mm)	180° HOOK		90° HOOK
		D+2db	L	L
10mm Ø	40	125	85	100
12mm Ø	50	165	115	115
16mm Ø	65	200	140	150
20mm Ø	115	250	165	300
25mm Ø	150	365	230	405

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
139 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE : CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER : PHILIPPINE COAST GUARD

PREPARED BY: Engr Josephine Marie B Trinidad, CE, Engineer III

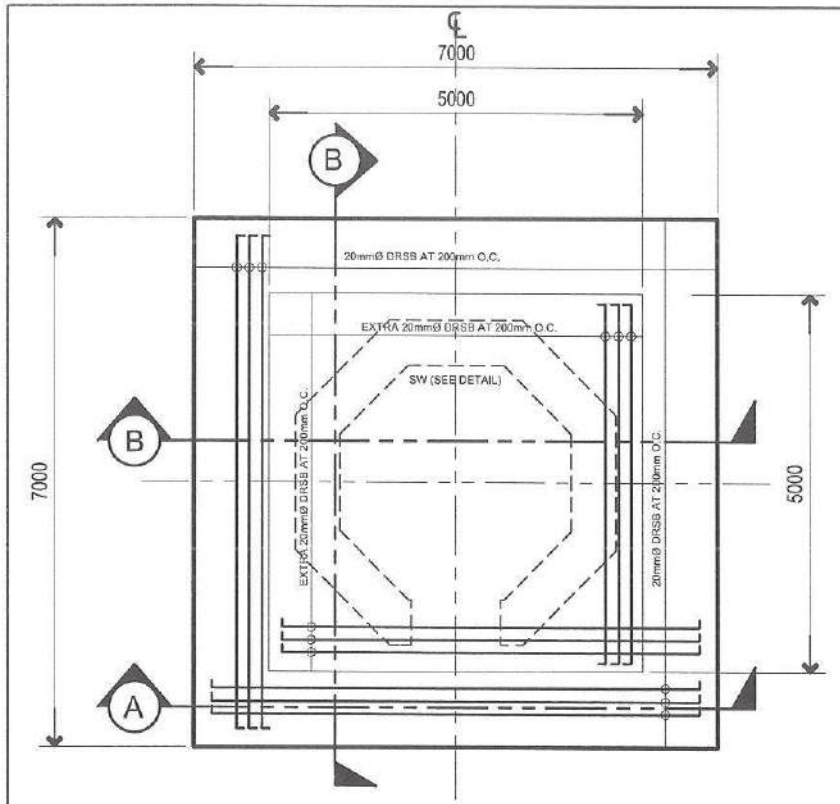
REVISION | DATE

CHECKED BY: CG LTJG ROMMEL O FAGARANG, Asst Head, Planning, Programming and Design Division

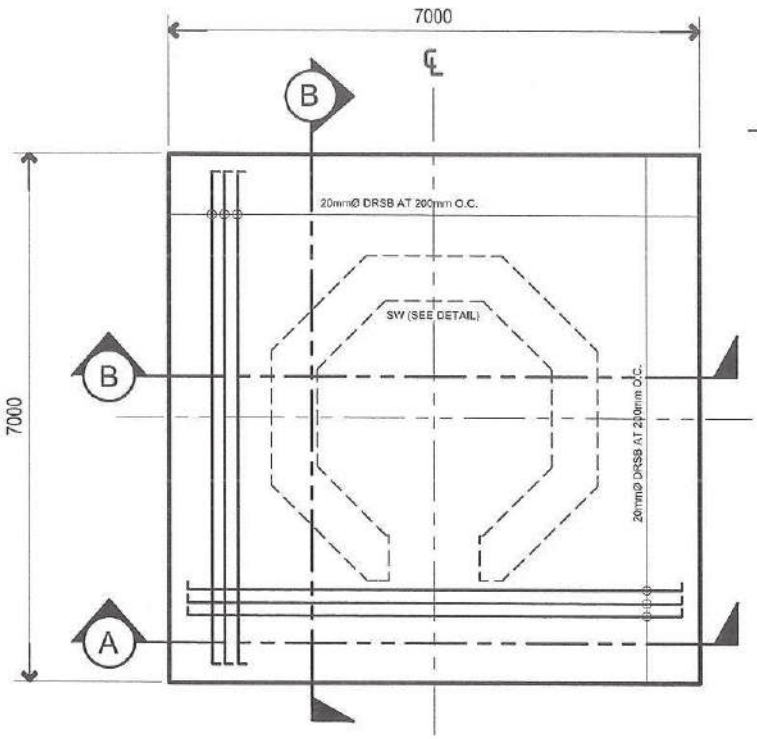
RECOMMENDING APPROVAL: Engr Hilario A Adaya, REE, Engineer IV

APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

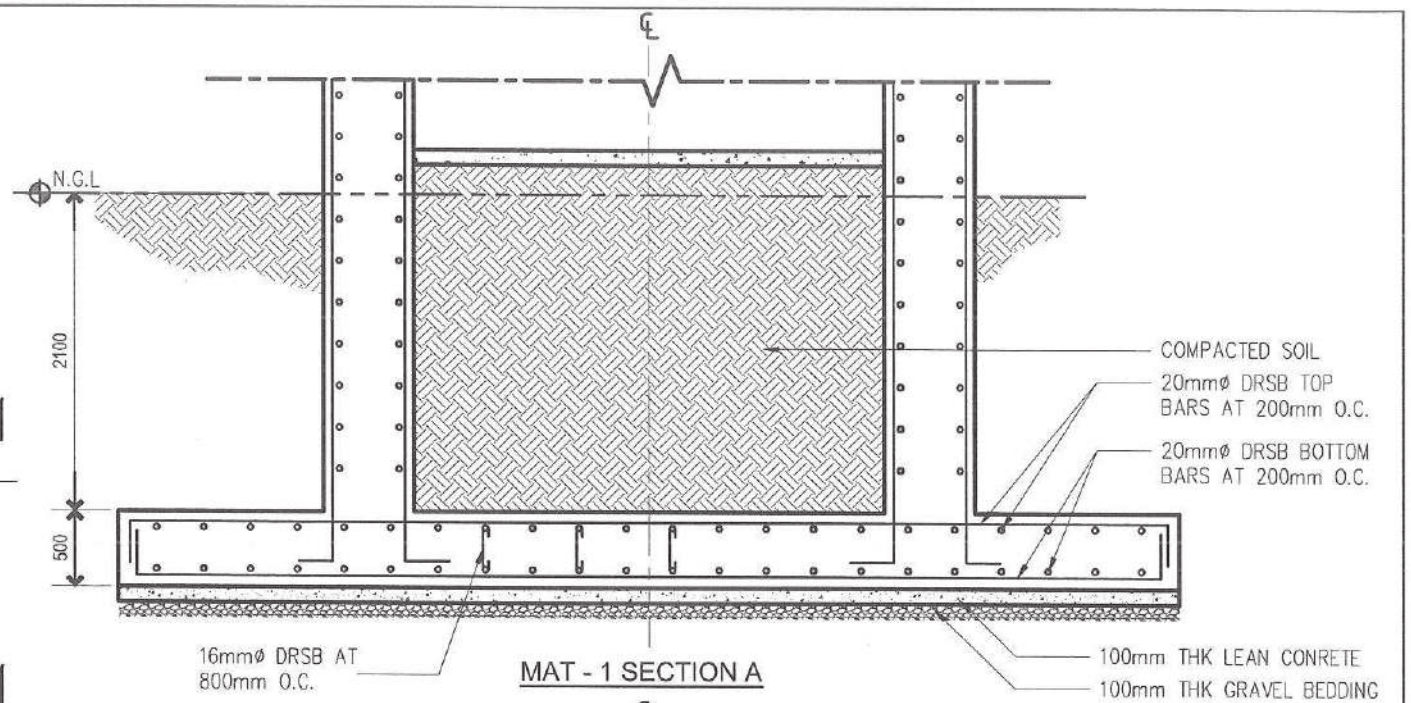
SHEET NO. 2 / 5



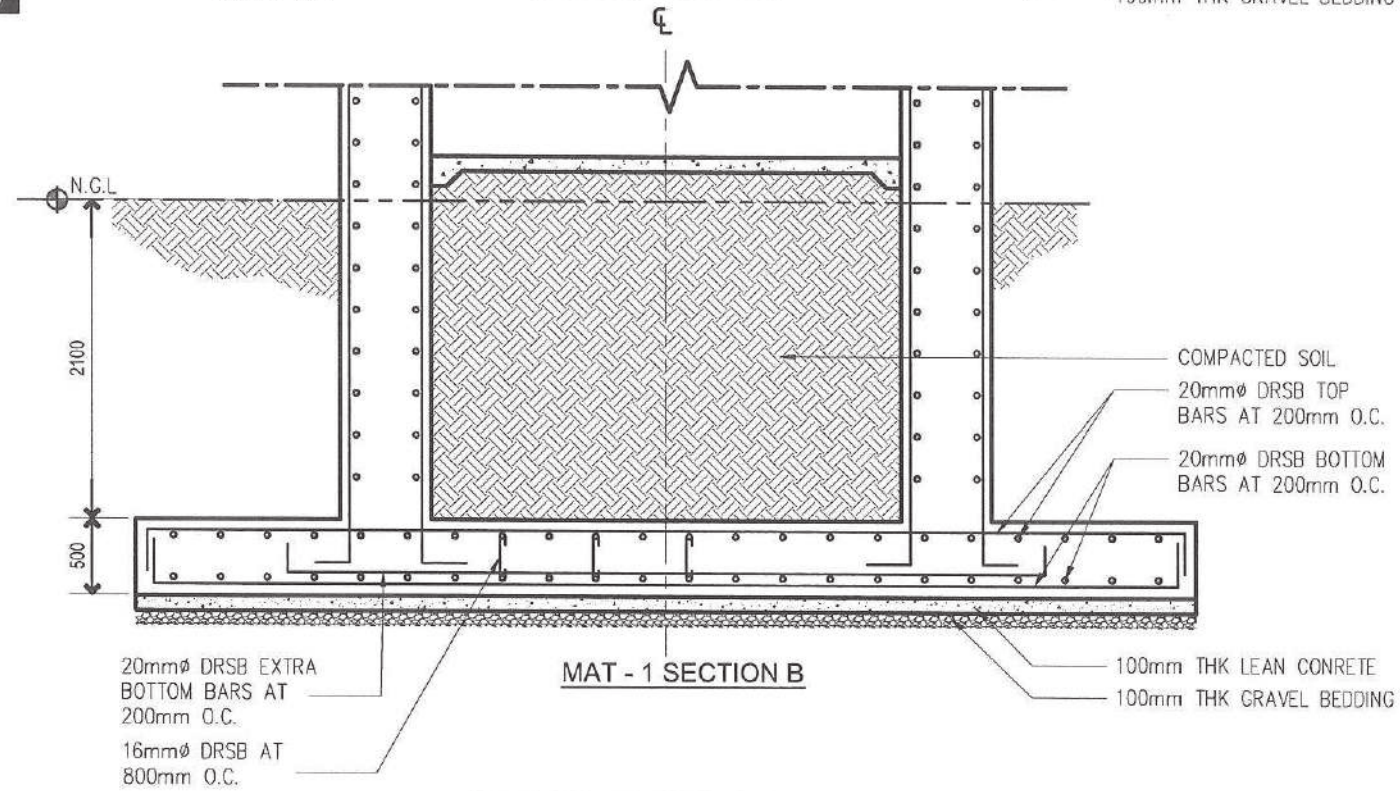
BOTTOM BARS



TOP BARS



MAT - 1 SECTION A



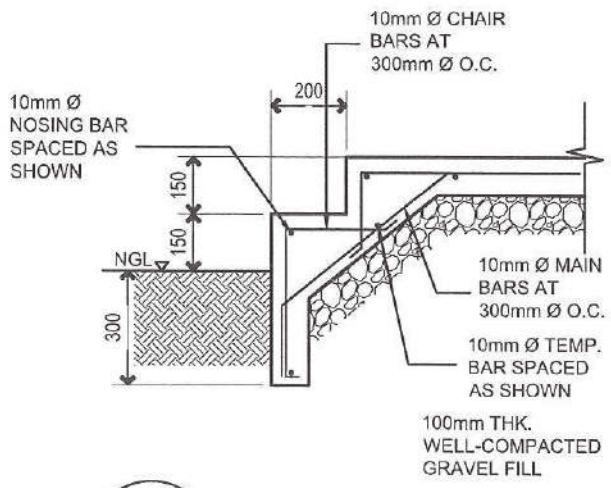
MAT - 1 SECTION B

MAT - 1 FOOTING PLAN

CG LIGHT STATION CONRADA

A / S 3 — FOUNDATION PLAN

SCALE 1:100M



C / S 3 — STAIR ON FILL DETAILS

SCALE 1:20 M

CG LIGHT STATION CONRADA

B / S 3 — MAT-1 FOOTING DETAILS

SCALE 1:100M

IMPORTANT NOTE:

IN CASE THE ACTUAL SITE LOCATION / CONDITION IS FOUND NOT ACCORDANCE WITH THE ASSUMED MAXIMUM WIND VELOCITY OF 320 KPH, SEISMIC SOURCE WITHIN 1.3KM AND SOIL BEARING CAPACITY OF 96 KPA, THE STRUCTURAL DESIGNER/ENGINEER SHALL BE NOTIFIED IN WRITING FOR PROPER REVISION OF THE STRUCTURAL PLAN.

PHILIPPINE COAST GUARD
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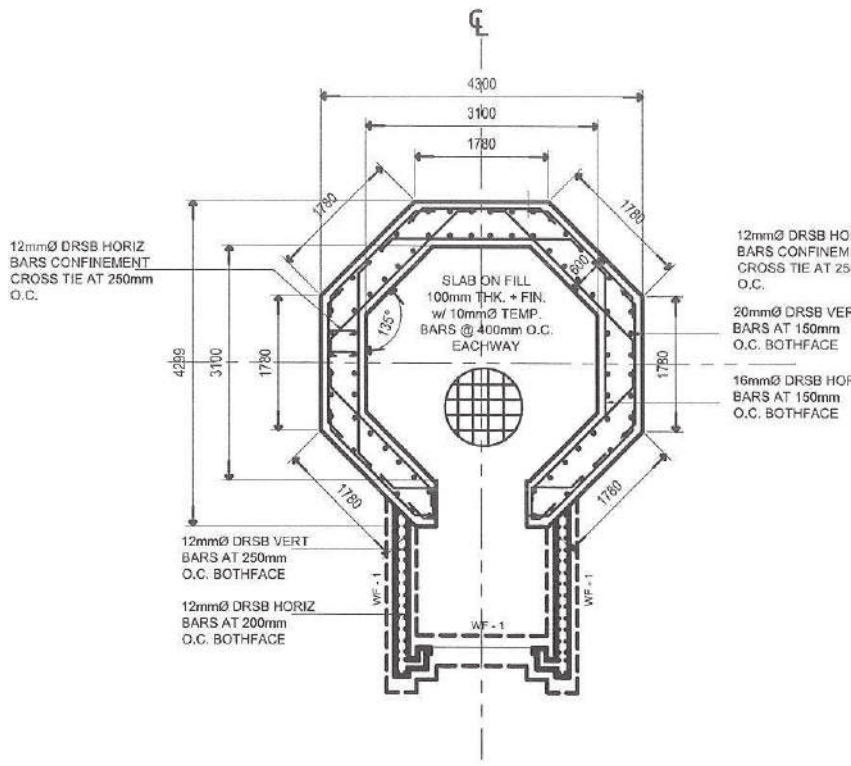
REVISION | DATE

CHECKED BY: CG LTJG ROMMEL O FAGARANG, Asst Head, Planning, Programming and Design Division

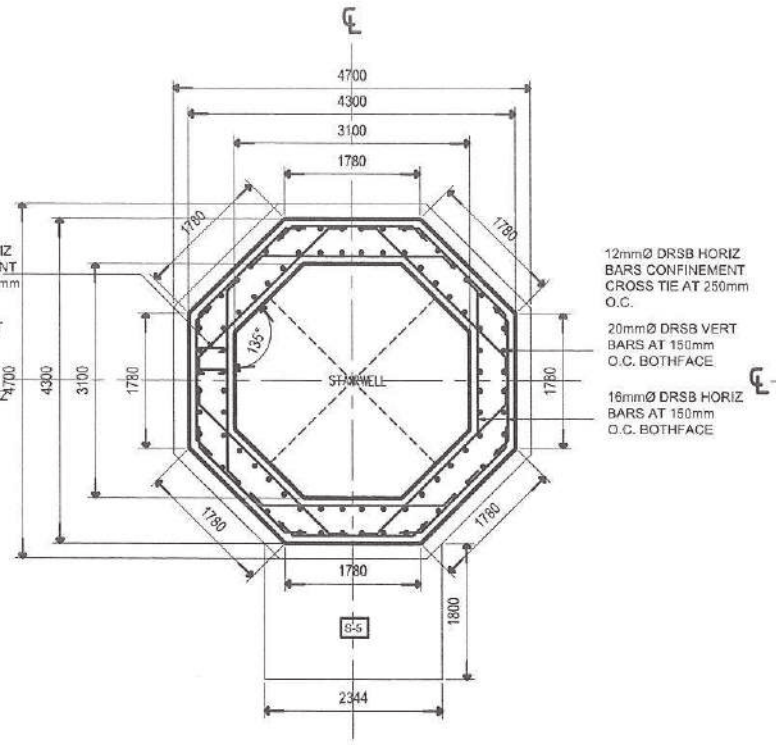
RECOMMENDING APPROVAL: Engr Hilario A Adaya, REE, Engineer IV

APPROVED BY: CG COMMO PRUDENCIO O PATRICIO JR, Commander, CGIDS

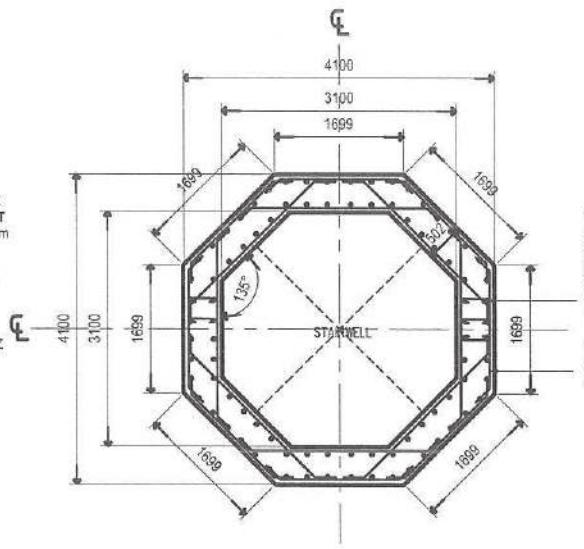
SHEET NO. 3 / 5



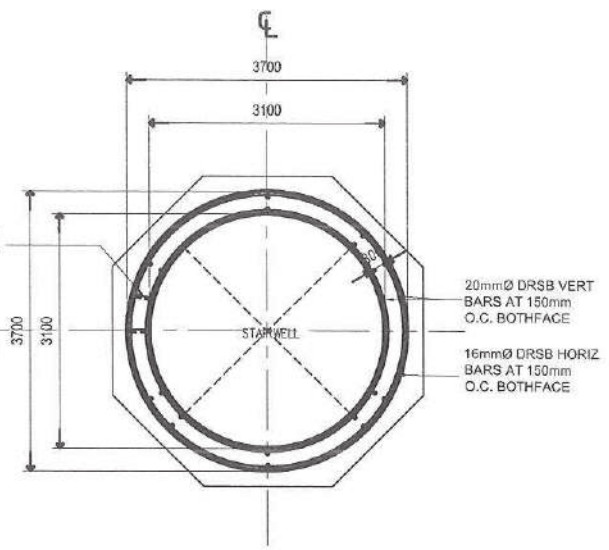
LEVEL 1 FRAMING PLAN



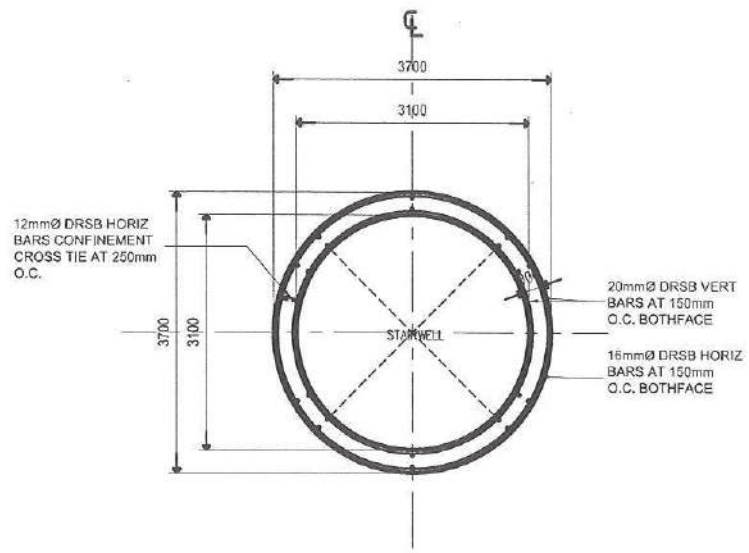
LEVEL 2 FRAMING PLAN



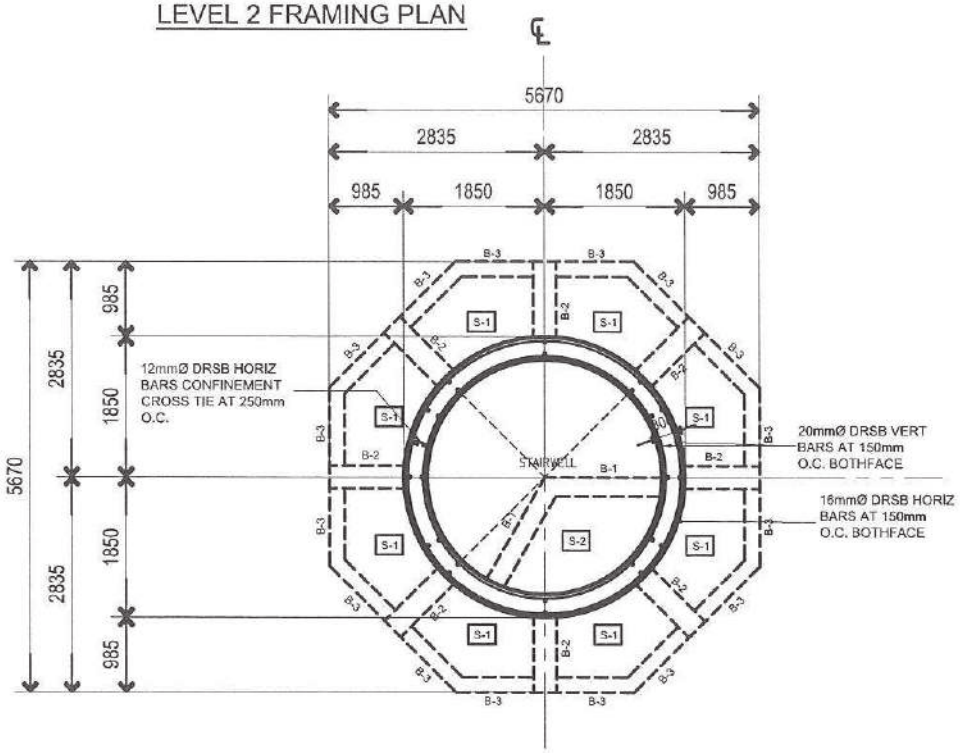
LEVEL 3 FRAMING PLAN



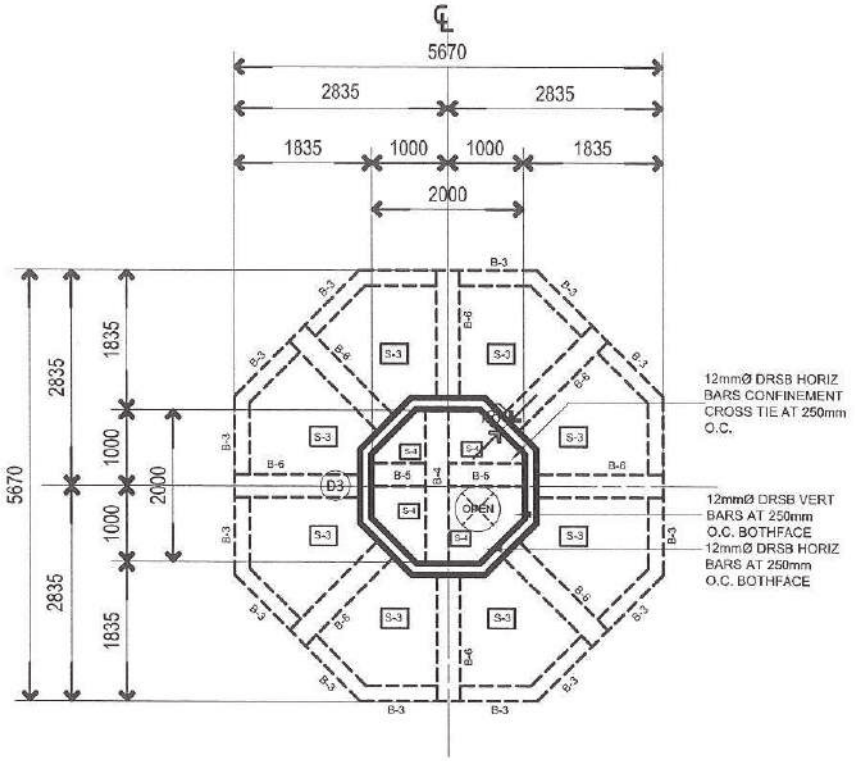
LEVEL 4 FRAMING PLAN



LEVEL 5 FRAMING PLAN



LEVEL 6 FRAMING PLAN



LEVEL 7 FRAMING PLAN

IMPORTANT NOTE:

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A S 4

CG LIGHT STATION CONRADA

FRAMING PLAN

SCALE 1:100M

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RECOMMENDING APPROVAL: Engr Hilario A Adaya, REE, Engineer IV

APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

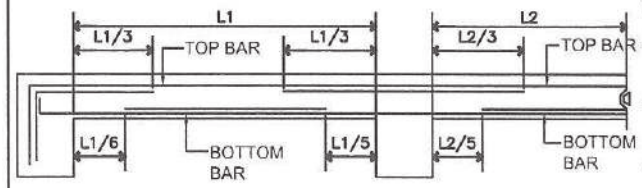
SHEET NO. 4 / 5

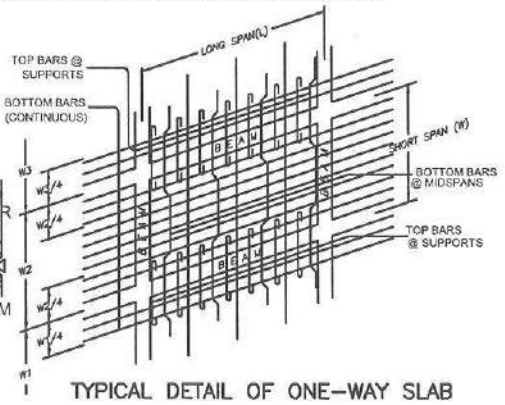
SCHEDULE OF SLABS

MARK	THICKNESS	SHORT SPAN			LONG SPAN			REMARKS
		AT SUPPORT		AT MIDSPAN	AT SUPPORT		AT MIDSPAN	
		TOP (CONT.)	TOP (END)	BOTTOM	TOP (CONT)	TOP (END)	BOTTOM	
S-1	125mm + FIN.	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	ONE WAY
S-2	125mm + FIN.	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	TWO WAY
S-3	125mm + FIN.	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	TWO WAY
S-4	125mm + FIN.	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	10mmØ @ 150mm	TWO WAY
S-5	125mm + FIN.	10mmØ @ 200mm	10mmØ @ 200mm	10mmØ @ 200mm	10mmØ @ 200mm	10mmØ @ 200mm	10mmØ @ 200mm	TWO WAY

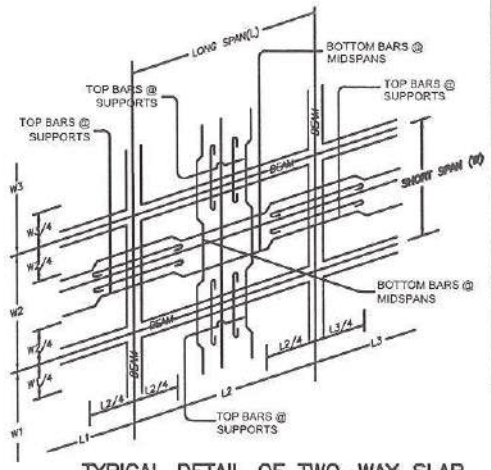
NOTES:

1. IN TWO WAY SLAB, THE BARS ALONG THE SHORT SPAN BE PLACED AT THE LOWER LAYER FOR BOTTOM BARS, AND THE UPPER LAYER FOR THE TOP BARS SO THAT THE BARS ALONG THE SHORT SPAN SHALL HAVE THE BIGGER EFFECTIVE DEPTH, UNLESS OTHERWISE DETAILED OR NOTED DUE TO THE CONTINUITY OF BARS FROM ADJOINING SPANS.
2. IF THE TOP REINFORCEMENT OVER A COMMON SUPPORT OF TWO ADJACENT SPANS ARE DIFFERENT, THE LARGER NEGATIVE STEEL AREA PER METER OF WIDTH SHALL BE FOLLOWED ON BOTH SLAB PANELS AT THAT COMMON SUPPORT.
3. BARS SHALL BE SPLICED ONLY WHERE INDICATED ON DETAILS OR AS APPROVED BY THE STRUCTURAL ENGINEER. STRAIGHT CONTINUOUS BARS IN SLABS MAY BE SPLICED (LAPPED WELDED) AT SUPPORT FOR BOTTOM BARS, AND AT MIDSPAN FOR THE TOP BARS.
4. SLAB CLEAR CONCRETE COVERING FOR TOP BARS AT SUPPORT AND BOTTOM BARS AT MIDSPAN SHALL NOT BE MORE THAN 20MM.
5. USE INDEPENDENT CHAIRS TO SHORE SLAB TOP BARS. BEAM TOP BARS SHOULD NOT BE USED AS CHAIRS FOR SLAB TOP BARS.





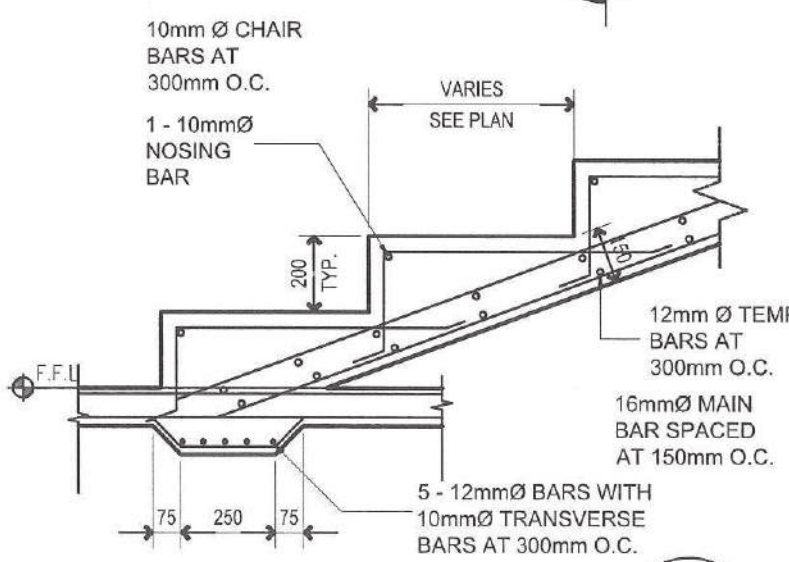
TYPICAL DETAIL OF ONE-WAY SLAB

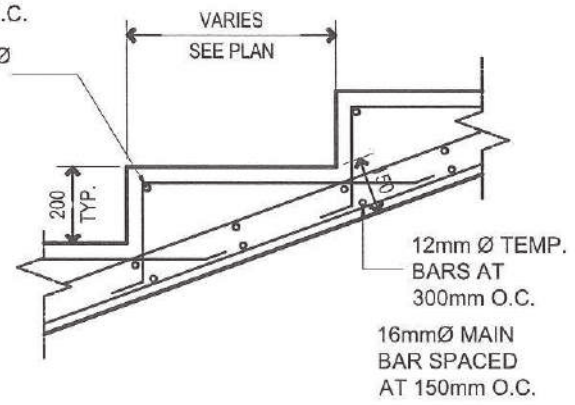


TYPICAL DETAIL OF TWO-WAY SLAB

A TYP. SLAB DETAIL

S 5 SCALE NTS



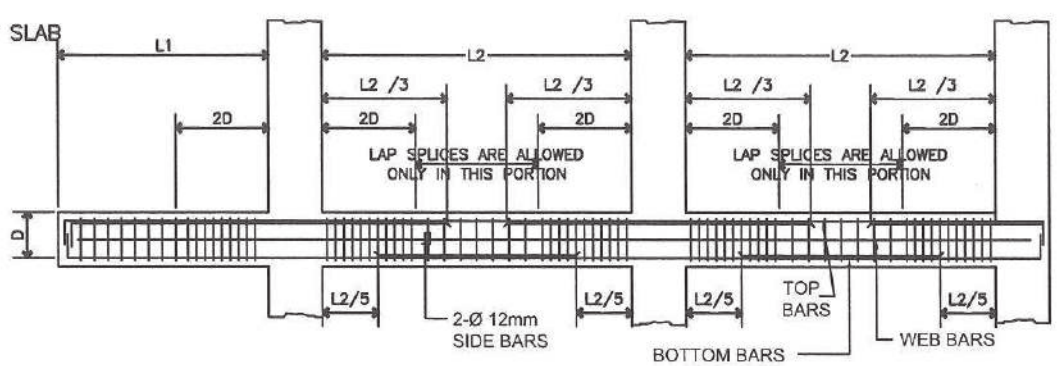


B STAIR DETAILS

S 5 SCALE NTS

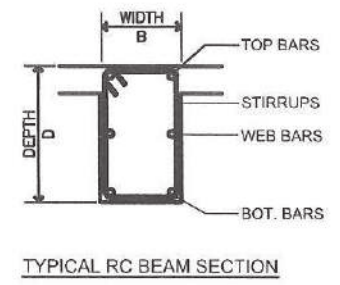
SCHEDULE OF GIRDERS AND BEAMS

FLOOR LEVEL	MARK	SIZES (mm)		REINFORCEMENT BARS				BAR ARRANGEMENT			STIRRUPS SIZE AND SPACING	REMARKS
		BREADTH	DEPTH	SUPPORT		MIDSPAN		EXT. SUPP.	MID SPAN	INT. SUPP.		
		B	D	TOP	BOTTOM	TOP	BOTTOM					
LEVEL 6	B-1	250	500	3 - 20mmØ	3 - 20mmØ	3 - 20mmØ	3 - 20mmØ				10MM - 1@50, 12@100, REST @150mm O.C.	-
	B-2	300	500	4 - 20mmØ	4 - 20mmØ	4 - 20mmØ	4 - 20mmØ				10MM - 1@50, REST @150mm O.C.	2 - 12mmØ WEB BARS
	B-3	250	400	4 - 16mmØ	4 - 16mmØ	4 - 16mmØ	4 - 16mmØ				10MM - 1@50, REST @ 200mm O.C.	2 - 10mmØ WEB BARS
LEVEL 7	B-4	250	500	3 - 20mmØ	3 - 20mmØ	3 - 20mmØ	3 - 20mmØ				10MM - 1@50, 12@100, REST @150mm O.C.	-
	B-5	250	400	3 - 20mmØ	3 - 20mmØ	3 - 20mmØ	3 - 20mmØ				10MM - 1@50, 12@100, REST @150mm O.C.	-
	B-6	300	500	4 - 20mmØ	4 - 20mmØ	4 - 20mmØ	4 - 20mmØ				10MM - 1@50, 12@75, REST @ 175mm O.C.	2 - 12mmØ WEB BARS
	B-7	250	400	4 - 16mmØ	4 - 16mmØ	4 - 16mmØ	4 - 16mmØ				10MM - 1@50, REST @ 200mm O.C.	2 - 10mmØ WEB BARS

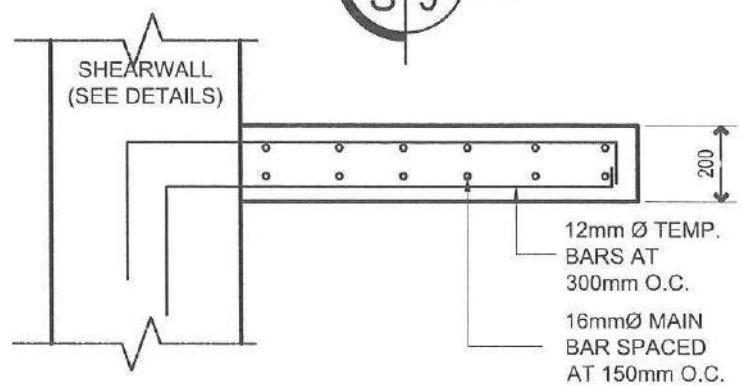


C TYP. BEAM ELEVATION DETAIL

S 5 SCALE NTS



TYPICAL RC BEAM SECTION



IMPORTANT NOTE:

IN CASE THE ACTUAL SITE LOCATION / CONDITION IS FOUND NOT ACCORDANCE WITH THE ASSUMED MAXIMUM WIND VELOCITY OF 320 KPH, SEISMIC SOURCE WITHIN 1.3KM AND SOIL BEARING CAPACITY OF 96 KPA, THE STRUCTURAL DESIGNER/ENGINEER SHALL BE NOTIFIED IN WRITING FOR PROPER REVISION OF THE STRUCTURAL PLAN.

PHILIPPINE COAST GUARD
HEADQUARTERS PHILIPPINE COAST GUARD
139 25TH ST. PORT AREA MANILA
COAST GUARD INFRASTRUCTURE DEVELOPMENT SERVICE

PROJECT TITLE	CONSTRUCTION OF CG LIGHT STATION CONRADA
LOCATION	BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER	PHILIPPINE COAST GUARD

PREPARED BY: Engr Josephine Marie B Trinidad, CE, Engineer III

REVISION | DATE

CHECKED BY: CG LTJG ROMMEL O FAGARANG, Asst Head, Planning, Programming and Design Division

RECOMMENDING APPROVAL: Engr Hilario A Adaya, REE, Engineer IV

APPROVED BY: CG COMMO PRUDENCIO C PATRICIO JR, Commander, CGIDS

SHEET NO. 5 / 5

BILL OF QUANTITIES

PROJECT TITLE : CONSTRUCTION OF COAST GUARD LIGHT STATION CONRADA
LOCATION : BAYWALK AREA, BRGY. WESTERN POBLACION, HILONGOS, LEYTE
OWNER : PHILIPPINE COAST GUARD
SUBJECT : BILL OF QUANTITIES

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
A.	**GENERAL REQUIREMENTS**				
01	Occupational Health & Safety Requirements	1	l.s		
02	Soil Foundation Investigation	1	l.s		
03	Temporary Facilities & Utilities	1	l.s		
04	Building Permit and Government Fees	1	l.s		
05	Project Billboard/Sigboard	1	e.a		
	Sub - Total A				
B.	**LAND DEVELOPMENT**				
B.I	**GRAVEL BEDDING**				
	Gravel Bedding				
01	Gravel Pavement 200mm Thick (w/ 5% Shringkage Factor)	20	cu.m		
	Sub - Total B.I				
B.II	**PERIMETER FENCE AND GATE**				
01	Structure Excavation, Common Soil	22.27	cu.m		
02	Embankment from Structure Excavation	16.45	cu.m		
03	Gravel Bedding (G-1)	1.15	cu.m		
	Column Footing , Column & Wall Footing				
04	Structural Concrete (Footings & Column) Class A-3000 PSI, 28 days	9.33	cu m		

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
	Rebar Works				
05	12mm dia Reinf. Steel Bars (Grade 40)	509.31	kgs		
06	10mm dia Reinf. Steel Bars (Grade 40)	224.33	kgs		
07	Formworks and Falseworks	78.75	sq.m		
08	CHB Non-Bearing Masonry Wall (including Reinforcement Steel) 150mm	41.1	sq.m		
09	Cement Plaster Finish/ Plastering	41.1	sq.m		
10	Decorative Stone	41.1	sq.m		
	Steel Works (Front Fence)				
11	Supply, fabrication and installation of 50mm x 50mm x 6mm Angle Bar Steel Attachment Fence with Barbed Wire, 25mm Dia.GI Pipe fully welded including all fixing accessories.	1	l.s		
12	**Steel Works (Rear and Side Fence)** Supply, fabrication and installation of 50mm x 50mm x 6mm Angle Bar Steel Attachment Fence with Barbed Wire, 25mm Dia.GI Pipe fully welded including all fixing accessories.	1	l.s		
13	**Steel Works (Front Gate)** Supply, fabrication and installation of Steel Gate using 100mm x 50mm x 2mm Tubular and 50mm x 50mm x 2mm Tubular fully welded including all fixing accessories.	1	l.s		
14	**Drain attached on CHB Wall** Supply, fabrication and installation of Steel Drain using 10mm Dia. Steel Bar with Plastic Mesh including all fixing accessories.	1	l.s		
	Painting Works				
15	Painting Works, Masonry Concrete	60	sq.m		
16	Painting Works, Steel	120	sq.m		
	Sub - Total B.II				

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
C.	**LIGHTHOUSE**				
C.I	**EARTHWORKS**				
01	Structure Excavation, Common Soil	127.4	cu.m		
02	Embankment from Structure Excavation	102.9	cu.m		
03	Gravel Bedding (G-1)	4.9	cu.m		
04	Damproofing (Polyethylene Sheets 1m x 25m)	12	sq.m		
	Sub - Total C.I				
C.II	**CONCRETE WORKS**				
	Lean Concrete				
01	Structural Concrete (Lean Concrete) Class AA-1500 PSI, 28 days	4.9	cu m		
	Footing				
02	Structural Concrete (Footings) Class AA-4000 PSI, 28 days	24.5	cu m		
	Shearwall and RC Wall				
03	Structural Concrete (Shearwall) Class AA-4000 PSI, 28 days	94.85	cu m		
	Beam and Concrete Corbel				
04	Structural Concrete (Beam & Corbel) Class AA-4000 PSI, 28 days	8.2	cu m		
	Suspended Slab				
05	Structural Concrete (Suspended Slab) Class AA-4000 PSI, 28 days	6.68	cu m		
	Stairs				
06	Structural Concrete (Stairs) Class AA-4000 PSI, 28 days	5.103	cu m		
	Slab on Fill				
07	Structural Concrete (SOF) Class AA-3000 PSI, 28 days	1.2	cu m		
	Sub - Total C.II				

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
C.III	**REBAR WORKS**				
	Footing				
01	20mm dia Reinf. Steel Bars (Grade 60)	3465.22	kgs		
02	16mm dia Reinf. Steel Bars (Grade 60)	115.04	kgs		
	Shearwall and RC Wall				
03	20mm dia Reinf. Steel Bars (Grade 60)	8445.888	kgs		
04	16mm dia Reinf. Steel Bars (Grade 60)	3945.48	kgs		
05	12mm dia Reinf. Steel Bars (Grade 40)	3220.052	kgs		
	Beam and Concrete Corbel				
06	20mm dia Reinf. Steel Bars (Grade 60)	978.8	kgs		
07	16mm dia Reinf. Steel Bars (Grade 60)	619.42	kgs		
08	12mm dia Reinf. Steel Bars (Grade 40)	44.539	kgs		
09	10mm dia Reinf. Steel Bars (Grade 40)	531.432	kgs		
	Suspended Slab				
10	10mm dia Reinf. Steel Bars (Grade 40)	544.86	kgs		
	Stairs				
11	16mm dia Reinf. Steel Bars (Grade 60)	145.66	kgs		
12	12mm dia Reinf. Steel Bars (Grade 40)	108.37	kgs		
13	10mm dia Reinf. Steel Bars (Grade 40)	139.7	kgs		
	Sub - Total C.III				

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
C.IV	**FORMWORKS & SCAFFOLDING**				
01	Formworks and Falseworks	537.52	sq.m		
	Sub - Total C.IV				
C.V	**FINISHING WORKS**				
01	Cement Plaster Finish	441.64	sq.m		
02	Cement Floor Finish	65.3	sq.m		
03	Aluminum with Rubber Stair Nosing 1.5mm X 14.7mm X 33mm X 2.5m	22	pcs		
	Sub - Total C.V				
C.VI	**DOORS & WINDOWS**				
01	(1120mm x 3000mm) Solid Aluminum Doors with Transom Louver including Door Jamb with complete accessories **(D-1) (1 set)**	3.36	sq.m		
02	(700mm x 2150mm) Solid Aluminum Door with Door Jamb and complete accessories **(D-2) (1 set)**	1.505	sq.m		
03	(600mm x 900mm) Solid Aluminum Door with Door Jamb and complete accessories **(D-3) (1 set)**	0.54	sq.m		
04	(600mm x 1200mm) Aluminum Window with 1/4" thick Glass with complete accessories **(W-1) (1 set)**	0.72	sq.m		
05	(600mm x 1200mm) Aluminum Window with 1/4" thick Glass with complete accessories **(W-2) (4 sets)**	2.88	sq.m		
06	(450mm Diameter) Aluminum Fixed Window with 1/4" thick Glass with complete accessories **(W-3) (4 sets)**	0.636	sq.m		
	Sub - Total C.VI				

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
C.VII	**STEEL WORKS**				
01	**Main Stair Railings** Supply, fabrication and installation of 50mm diameter S.S pipe handrail with 38mm Dia. Stainless Pipe baluster member, fully welded including all fixing accessories.	1	l.s		
02	**Platform Railings** Supply, fabrication and installation of 50mm diameter S.S pipe handrail and Guardrail with 38mm Dia. Stainless Pipe baluster member, fully welded including all fixing accessories.	1	l.s		
03	**Ladder Rung** Supply, fabrication and installation of 16mm Dia. Stainless steel Ladder Rung on 20mm x 50mm Steel Stile (Flat Bar) fully welded including all fixing accessories	1	l.s		
04	**Solar Panel Framing** Supply, fabrication and installation of 41mm x 67mm Strut Channel Framing with Angle Cleat Connector and Nuts and Bolts fixed at 12mm Dia. Anchor bolt fully welded including all fixing accessories	1	l.s		
05	**Beacon Pedestal** Supply, fabrication and installation of 150mm Dia. Stainless Steel Pipe SC 40 with 350mm x 350mm x 20mm Thick Stainless Steel Plate fully welded including all fixing accessories	1	l.s		
	Sub - Total C.VII				

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
C.VIII	**BEACON HOUSING WORKS**				
01	**Beacon Housing Framing and Roof Framing** Supply, fabrication and installation of 2" x 3/4 " Thick Aluminum Flat bar Framing with 1 1/2" x 3/4 " Thick Aluminum Flat bar, 1" Aluminum Pipe Aluminum Handrail with Bolt, Carriage Bolt with Nuts and Washer fully welded including all fixing accessories.	1	l.s		
02	**Beacon Fixed Window** Supply, fabrication and installation of 10mm Thick Tempered Fixed Glass Silicone Butt Joint on Powder Coated Aluminum Framing including all fixing accessories.	12.16	sq.m		
03	**Beacon Roofing Sheets** Supply, fabrication and installation of 1/2" Thick Aluminum Flat Sheet including all fixing accessories.	14.3	sq.m		
	Sub - Total C.VIII				
C.IX	**WATERPROOFING WORKS**				
01	Cementitios Waterproofing (Deck) (2 Coats)	53.3	sq.m		
	Sub - Total C.IX				
C.X	**PAINTING WORKS**				
01	Interior Painting Works Concrete	216.00	sq.m		
02	Exterior Painting Works Concrete (Elastomeric Paint)	253.50	sq.m		
03	Painting Works, Steel	50	sq.m		
	Sub - Total C.X				

ITEM NO	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
C.XI	**ELECTRICAL WORKS**				
	LIGHTNING/SURGE ARRESTER				
01	Lightning Terminal Arrester	1.00	set		
02	500mm x 500mm x 3mm Copper Grounding Plate	4.00	pcs		
03	Copper Nut. Check Nut and Washer	8.00	pcs		
04	22 mm² Bare Copper Wire Stranded	35.00	mtrs		
05	5/8 x 6' Ground Rod	4.00	pcs		
06	25mm Ø Ground Rod Connector Compression Type	1.00	pcs		
07	25mm Ø Bare Copper Conductor/Isolator Connector Compression Type	1.00	pcs		
08	25mm Ø PVC	5.00	lngths		
09	Cable Fasterner	15.00	pcs		
	Sub - Total C.XI				
	TOTAL COST				₱

AMOUNT IN WORDS: _____

Submitted by:

_____ _____

Name and Signature of Bidder's Representative Date

_____

Position

_____

Name of the Company